1986 - 1996 TRAVEL TRENDS IN THE GTA & HAMILTON-WENTWORTH

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EXECUTIVE SUMMARY

This report documents changes in Greater Toronto Area (GTA) and Hamilton-Wentworth locational and socio-demographic patterns and related changes in travel behaviour since 1986, with reference to the 1986, 1991 and 1996 TTS results.

The analysis of changing travel characteristics focuses on work trip generation and distribution and mode choice issues. The report considers how and why such changes have emerged, and the implications of the identified changes for the planning of road and transit facilities and services across the GTA.

Population, Labour Force and Employment

Changes in population, labour force and employment over the 1986 to 1996 period are discussed in section 2, along with changes in the student population. The documented trends largely determined changes in the work-related trip making that dominates the peak travel periods and determines transportation requirements.

Section 2.2 documents the economic conditions across the GTA and Hamilton-Wentworth with reference to available data from Statistics Canada and the Metro Toronto employment surveys (MTES) for the new City of Toronto.

The number of employed residents in the GTA and Hamilton-Wentworth increased rapidly in the 1986-1989 period until the onset of the recession in 1990. The GTA lost more than 180,000 jobs in the 1989-1992 period, as a result of the recession. However, most of the employment losses were in the cities of Toronto and Hamilton.

In Toronto, the declining employment resulted in substantial declines in employed labour force between 1986 and 1991 and between 1991 and 1996, despite continued increases in population. The available data suggest that whereas Toronto saw continuous declines in employment and labour force over the 1986-1996 period, the four suburban Regions in the GTA experienced continuous growth during the same period, at a slightly reduced growth rate rather than losses in both employment and labour force.

Other Relevant Socio-demographic Factors

Section 3 discusses “other relevant socio-demographic factors” that influence travel behaviour including changing age structure, possession of driver’s licences, and auto availability.

The evolving age structure of Toronto, the four Suburban Regions, and Hamilton-Wentworth is discussed in relation to migration trends and mode choice in section 3.1.

Section 3.2 documents changes in the possession of valid driver's licences among men and women, including declines after 1991. The major declines in driver's licence possession were among men and women under the age of 21, particularly among students. However, there were continued increases in the proportion of working women who possessed a valid driver's licence in Toronto, Hamilton-Wentworth and the suburban regions. Across the GTA, driver's licence possession among working women is approaching the levels observed for working males.

Section 3.3 discusses vehicle availability, noting a small decline in overall availability between 1986 and 1996, but increases in the average number of vehicles available per worker.

Transportation Implications – Changing Travel Patterns

Section 4 documents changes in travel patterns resulting from the land use and socio-demographic shifts discusses in sections 2 and 3.

As shown in Sections 4.1 and 4.2, the amount and timing of peak period trips was directly influenced by the changing nature of work activities including the reduced labour force participation rate and increased part-time work opportunities.

The trends in labour force activity resulted in proportionately fewer work trips due to decline in labour force participation rate and shift from full-time to part-time work. However, during the 1986-1996 period, changes in the number of work trips per worker were also noted, including increased numbers of first work trips per day for both full-time and part-time workers. The GTA and Hamilton-Wentworth data suggest a 5% increase in first work trips for male and female full time workers, a 14% increase in first work trips for part time males and an 8% increase in first work trips for part time females.

Both work and school trip start times have shifted as a result of changes in the nature of work activities and changes in school start and finish times. For example, the Toronto data shows a large decline in work trips starting between 6:00 and 8:00 and a consistent increase in work trips starting between 8:30 and 15:00 hours. Significant shifts in school start and finish times are also discussed.

Job losses in Toronto and Hamilton combined with continued population and employment growth in the suburban Regions led to changes in live-work relationships and commuting patterns between 1986 and 1996, as documented in Section 4.3, with reference to exhibits showing changes in first work trips ending in seven destinations across the GTA and Hamilton-Wentworth.

Section 4.4 discusses observed declines in transit mode splits for men and women between 1986 and 1996, in relation to changing age structure and observed changes in transit trip rates by gender.

Conclusions and Recommendations

The TTS data, along with MTES employment counts for Toronto and Statistics Canada Labour Force Survey data, document the impact of the recession on the economies of Toronto and Hamilton and the loss of jobs in both cities. The 1990 recession reversed the long standing trend toward increased female labour force participation, particularly in Toronto and Hamilton-Wentworth and accelerated the trend toward reduced male labour force participation, that had been associated with early retirements among men aged 55-64. The recession also resulted in a dramatic decentralization of employment opportunities that resulted in the changes in travel patterns documented in Section 4.

The GTA and Hamilton-Wentworth currently has high unemployment rates among men and women, particularly those living in the cities of Toronto and Hamilton. However, this situation could change rapidly in the future assuming the continued recovery of the economy and recognizing future changes in age structure that can be expected to reduce the size of the working age population.

The declines in employment and employed labour force relative to population reported in the TTS are not consistent with OGTA land use forecasts for the GTA and particularly the new City of Toronto. The Hemson estimates of employment for 2011 and 2021 do not appear to recognize the large declines in employment in Toronto and Hamilton that occurred after 1989 or the failure of the Toronto economy and Toronto's Central Area to recover from these job losses.

The TTS results suggest that the land use assumptions that underlie recent and ongoing transportation planning activities should be updated to recognize the distinct possibility that Toronto's employment will be substantially below the expected 2011 and 2021 levels. Current estimates of 2011 and 2021 employment for Toronto and the GTA represent the highest levels that might be achieved, rather than the most likely scenario.

The findings with respect to land use forecasts highlight the need for GTA planning agencies to maintain accurate and up-to-date employment data at both the municipal and traffic zone level. The former Metropolitan Toronto Planning Department's employment surveys provide one model that should be considered by the other Regions in order to establish time-series information on employment trends at the traffic zone level.

The 1996 TTS results also indicate that trip generation rates and mode-split forecasting relationships developed on the basis of the 1986 Transportation Tomorrow Survey should be reassessed in the light of the results of the 1996 Survey. For example, the observed declines in employed labour force/ population ratios, increases in part-time work, changes in work trip rates for full and part-time workers, and the spreading of work and school peaks, suggests that trip generation rates and peaking factors should be adjusted downward.

A number of land use/locational, demographic, socio-economic and behavioural changes over the 1986-1996 period imply reduced transit ridership potential in

the future and the need to update current approaches to estimating transit mode choice.

The relevant changes include:

- The aging of the population and related transit ridership losses, as documented in sections 3.1 and 4.5.
- Changes in travel patterns related to the suburbanization of employment and decentralization of inner city workers, as documented in section 4.3.
- Increases in driver's licences among working women, as documented in section 3.2.
- Increasing numbers of cars available per worker (section 3.3).
- Declining mode splits and transit trip rates for some age/gender cohorts (discussed in sections 3.1 and 4.5).

These factors are all inter-related. For example, aging is related to the observed declines in transit trip making by age group, in that younger cohorts take their unique characteristics with them as they get older. Also, the decentralization of employment opportunities may well have made car ownership and operation necessary. Developing suburban job opportunities are often not accessible by transit.

Only GO Transit benefited from the decentralization of the downtown Toronto workforce. GO Rail services enjoyed substantial increases in ridership between 1985 and 1990, but lost ridership in the early 1990's when total employment in downtown Toronto fell. GO Rail's future depends on the future of the downtown Toronto economy.

The findings presented in Section 4 related to work trip generation and distribution underscore the need to update current forecasting models to incorporate the results of the 1996 TTS survey.

The changes in labour force activity, employment and trip distribution patterns observed in the 1986 to 1996 period were unexpected and are not reflected in current forecasts. These changes highlight the benefits of the Transportation Tomorrow Survey and the need to continue to monitor travel behaviour on a regular basis.

1. INTRODUCTION

The Transportation Tomorrow Survey (TTS) provides a unique time-series data base that captures the evolving travel behaviour of the GTA and Hamilton-Wentworth residents at three points in time: 1986, 1991 and 1996. Equally important, the TTS documents changes in the demographic and socio-economic characteristics that influence travel behaviour including changes in age structure, employment or student status, and vehicle availability.

The survey instrument and data collection methods used in 1991 and 1996 were consistent with those used in the initial 1986 TTS survey. Therefore, the three TTS surveys provide an excellent database for identifying, describing and understanding changes in travel behaviour and travel patterns over the period 1986 to 1996.

This report documents changes in Greater Toronto Area (GTA) locational and socio-demographic patterns and related changes in travel behaviour since 1986. The analysis of changing travel characteristics focuses on work trip generation and distribution and mode choice issues including the propensity to use transit. The report considers how and why such changes have emerged, and what the implications of the identified changes might be for the planning of road and transit facilities and services across the GTA.

For this report, the GTA is defined to include the amalgamated City of Toronto and the Regional Municipalities of Durham, Halton, Peel and York. All references to Toronto refers to the new amalgamated City of Toronto.

1.1 Understanding the Changes

Any interpretation of changes in travel behaviour during the 1986-1996 period must recognize the impact of the 1990-1991 recession on the GTA's economic base and related evolutionary changes in the distribution of population, labour force and employment. Therefore, this report refers to available labour force and employment data for the GTA and for Toronto in specific, and related information on auto availability and driver's licence possession, in an effort to put the TTS data in context.

The analysis presented in this report focuses on the 1986 and 1996 TTS data with limited references to 1991. The 1986 and 1996 surveys sampled approximately 5% of all households across the GTA and Hamilton-Wentworth. The 1991 TTS sampled 5% of households in growth areas but only 0.5% in low growth areas, including most of the City of Toronto (previously defined as Metropolitan Toronto) and all those areas within the other Regions that were substantially developed in 1986. The smaller sample size in developed areas in 1991 results in much wider confidence intervals for all estimates.

2. POPULATION, LABOUR FORCE AND EMPLOYMENT

The changing distribution of population, labour force and employment in the GTA and Hamilton-Wentworth between 1986 and 1996 largely determined changes in the work-related trip making that dominates the peak travel periods and determines transportation requirements.

2.1 Population

The growth of the GTA population is summarized in Exhibit 1 for Toronto, Hamilton-Wentworth and the remaining GTA Regional Municipalities. While all areas experienced population increases over the 1986-1996 period, the Regions accounted for more than 75% of the total increase in population.[1]

Exhibit 1 – Population Change (TTS estimates*)

	1986	1991	1996
(Metro)Toronto	2,135,000	2,214,000	2,305,600
Hamilton-Wentworth	423,400	445,000	462,000
Halton, Peel, York, Durham	1,504,500	1,910,500	2,158,800
GTA	4,062,900	4,569,500	4,926,400

* The TTS understates population by 2-3%. For example, the 1996 Census figure for (Metro)Toronto is 2,385,421

2.2 Labour Force and Employment

During the 1986-1996 period, the GTA experienced varied economic conditions as shown in Exhibit 2, Total Employed Labour Force by CMA (Census Metropolitan Area) and GTA. The number of employed residents in the GTA increased rapidly in the 1986-1989 period until the onset of the recession in 1990. The GTA lost more than 180,000 jobs in the 1989-1992 period, as a result of the recession. Most of these losses were in the cities of Toronto and Hamilton.

The Metro Toronto Employment Surveys (MTES), the only ongoing employment survey in the GTA, indicate that between 1989 and 1992 Toronto lost 124,000 jobs, including 60,000 jobs in industrial areas and more than 35,000 office jobs. Toronto's Central Area (i.e., Planning District 1) lost 47,000 jobs during this period.

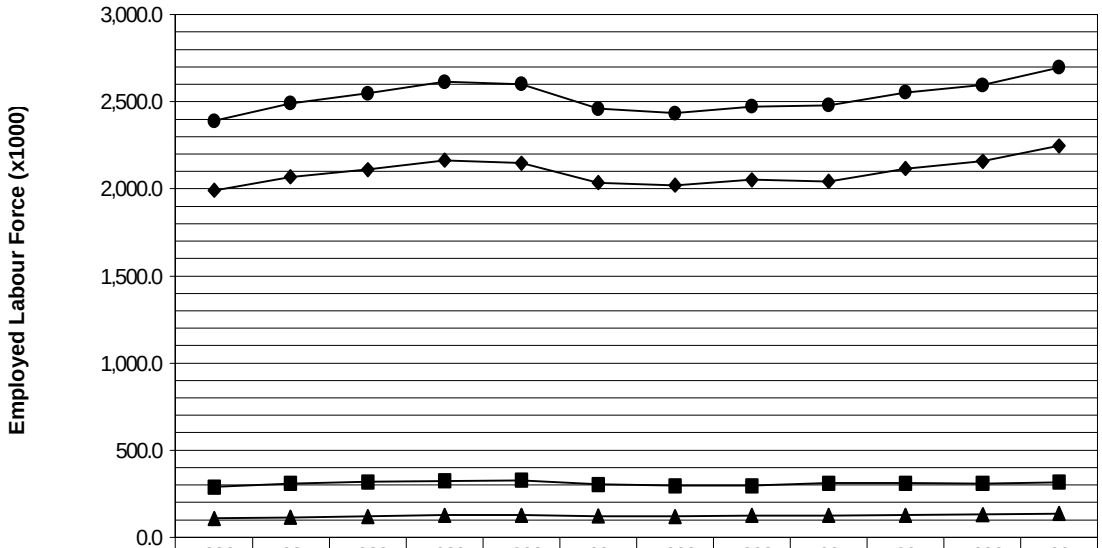
According to reported MTES results, further employment losses of approximately 80,000 were experienced in Toronto between 1992 and 1996, despite the recovery of the GTA economy (and the estimated 162,000 increase in employed labour force across the GTA). It was not until 1997 that Toronto began to experience a modest

[1] One factor in Toronto's continued population increase during this period was the reversal of a long-standing trend of declining household size. Whereas household size in Toronto had fallen continually since 1945, it was stable in the 1986-1996 period.

recovery in employment and the GTA surpassed the 1989 pre-recession employment total.

Exhibit 2 – Total Employed Labour Force by C(M)A and GTA+*

(Source: 1986 Census and Statistics Canada Labour Force Surveys)
* [Hamilton includes Grimsby, Toronto includes New Tecumseh, Bradford and West Gwillimbury]



	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997
Toronto	1,992.1	2,069.4	2,110.0	2,165.0	2,147.8	2,036.1	2,020.8	2,052.6	2,043.2	2,115.8	2,158.5	2,246.5
Hamilton	288.6	308.4	317.4	323.5	326.7	303.1	295.3	295.5	311.2	311.0	308.5	315.2
Oshawa	108.9	113.9	119.8	126.4	127.3	121.4	118.8	125.2	125.7	127.4	129.6	136.0
GTA+ *	2,389.6	2,491.7	2,547.2	2,614.9	2,601.8	2,460.6	2,434.9	2,473.3	2,480.1	2,554.2	2,596.6	2,697.7

The TTS estimates of employed labour force and employment for Toronto and municipalities outside Toronto for 1986, 1991 and 1996 are presented in Exhibits 3 and 4 by planning districts. The planning districts are illustrated in Map 1.

The TTS estimates of labour force and employment, while not being directly comparable to Statistics Canada Labour force estimates or the Metro Toronto Employment Survey figures, are generally consistent with these sources in terms of the magnitude and nature of labour force and employment changes between the three survey years.[2]

[2] The TTS data shows an increase in employed labour force of 183,000 between 1986 and 1996, whereas Statistics Canada labour force survey suggests that the employed labour force resident in the GTA plus the neighboring municipalities of Grimsby, Bradford/East Gwillinbury, and New Tecumseh increased by approximately 207,000.

All three data sets point to reduced labour force participation for men of all ages and women ages 15-24 between 1986 and 1996, with reduction in full time employment being partially counter-balanced by increases in part-time employment as documented in Appendix A.

Map 1 - The 46 Planning Districts

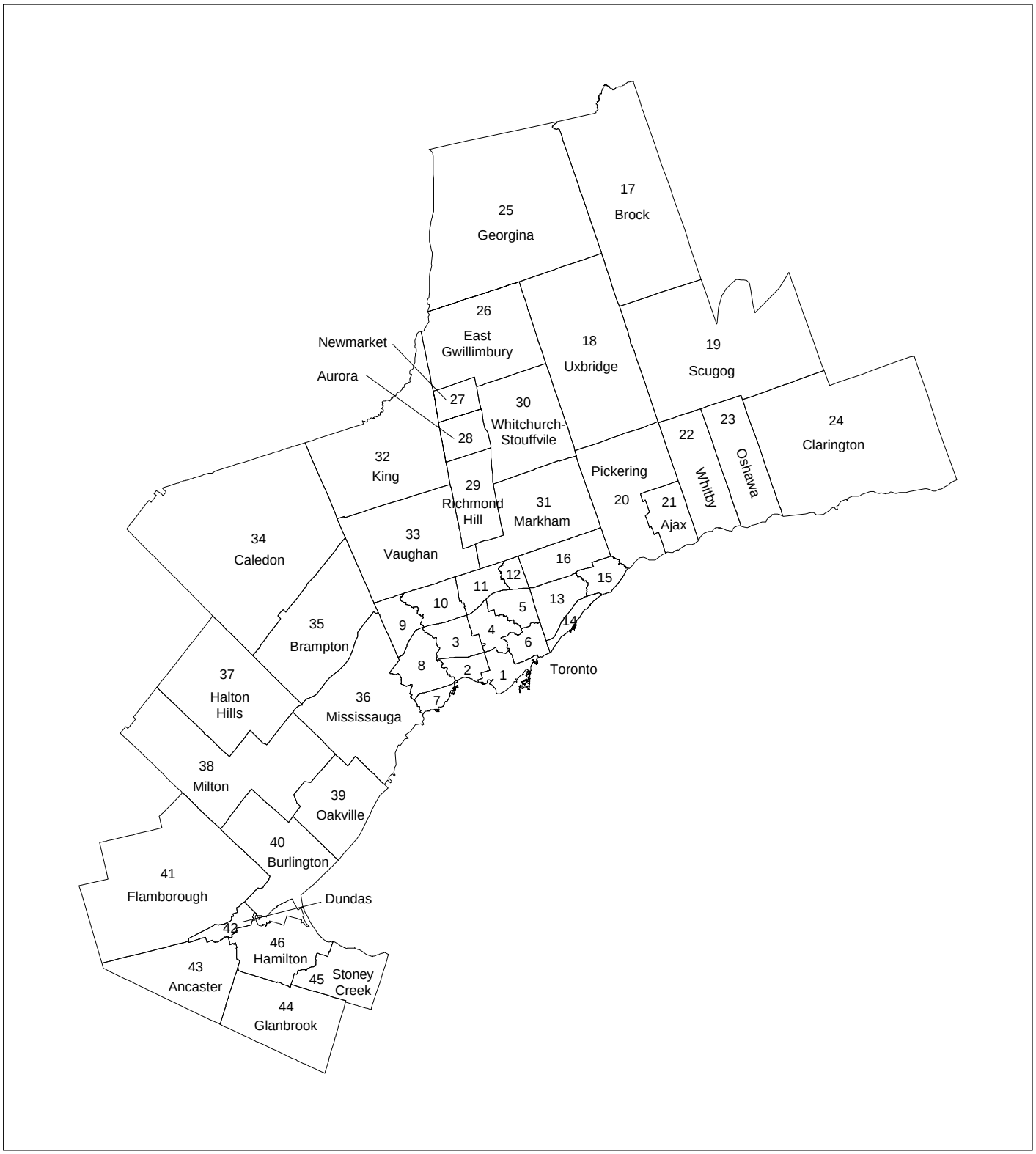


Exhibit 3 – GTA Employed Labour Force (at place of residence)*

Location	1986 TTS	1991 TTS	1996 TTS	1996/1986	change 1991/1986	1996/1991
PD1-Metro	80,277	79,996	83,205	1.04	1.00	1.04
PD2-Metro	108,265	105,832	103,407	0.96	0.98	0.98
PD3-Metro	120,724	107,750	105,673	0.88	0.89	0.98
PD4-Metro	106,636	102,321	103,601	0.97	0.96	1.01
PD5-Metro	58,842	58,186	51,637	0.88	0.99	0.89
PD6-Metro	114,232	117,622	106,444	0.93	1.03	0.90
PD7-Metro	29,676	26,845	27,331	0.92	0.90	1.02
PD8-Metro	99,794	88,664	79,034	0.79	0.89	0.89
PD9-Metro	42,289	37,804	38,889	0.92	0.89	1.03
PD10-Metro	79,351	66,623	63,098	0.80	0.84	0.95
PD11-Metro	66,249	63,467	65,811	0.99	0.96	1.04
PD12-Metro	44,419	38,567	36,532	0.82	0.87	0.95
PD13-Metro	100,788	94,433	87,571	0.87	0.94	0.93
PD14-Metro	29,762	29,446	27,509	0.92	0.99	0.93
PD15-Metro	38,372	44,473	37,589	0.98	1.16	0.85
PD16-Metro	94,887	96,508	92,403	0.97	1.02	0.96
Total Toronto	**1,214,561**	**1,158,534**	**1,109,733**	**0.91**	**0.95**	**0.96**
Brock	4,578	4,410	4,521	0.99	0.96	1.03
Uxbridge	5,726	6,823	7,106	1.24	1.19	1.04
Scugog	7,941	9,607	9,493	1.20	1.21	0.99
Pickering	25,970	37,315	38,924	1.50	1.44	1.04
Ajax	19,581	29,670	33,647	1.72	1.52	1.13
Whitby	22,747	30,615	36,290	1.60	1.35	1.19
Oshawa	62,602	65,416	63,058	1.01	1.04	0.96
Clarington	16,380	23,425	29,112	1.78	1.43	1.24
Total Durham	**165,525**	**207,282**	**222,151**	**1.34**	**1.25**	**1.07**
Georgina	12,467	16,128	16,192	1.30	1.29	1.00
East Gwillimbury	7,607	9,698	9,520	1.25	1.27	0.98
Newmarket	18,239	24,059	28,016	1.54	1.32	1.16
Aurora	11,118	15,597	17,202	1.55	1.40	1.10
Richmond Hill	24,952	38,481	47,380	1.90	1.54	1.23
Whit.-Stouff.	7,510	9,407	9,736	1.30	1.25	1.03
Markham	59,843	75,010	79,273	1.32	1.25	1.06
King	9,048	9,734	9,182	1.01	1.08	0.94
Vaughan	34,444	55,756	63,834	1.85	1.62	1.14
Total York	**185,228**	**253,870**	**280,336**	**1.51**	**1.37**	**1.10**
Caledon	16,313	17,956	19,888	1.22	1.10	1.11
Brampton	102,076	125,330	135,260	1.33	1.23	1.08
Mississauga	207,537	240,486	269,491	1.30	1.16	1.12
Total Peel	**325,926**	**383,771**	**424,639**	**1.30**	**1.18**	**1.11**
Halton Hills	18,617	19,306	21,355	1.15	1.04	1.11
Milton	16,214	17,790	16,769	1.03	1.10	0.94
Oakville	44,964	58,724	63,737	1.42	1.31	1.09
Burlington	61,348	67,582	69,836	1.14	1.10	1.03
Total Halton	**141,143**	**163,402**	**171,697**	1.22	**1.16**	**1.05**
Flamborough	12,811	14,369	15,988	1.25	1.12	1.11
Dundas	9,360	10,018	10,702	1.14	1.07	1.07
Ancaster	8,329	10,468	11,201	1.34	1.26	1.07
Glanbrook	4,859	5,291	4,756	0.98	1.09	0.90
Stoney Creek	20,566	24,794	25,756	1.25	1.21	1.04
Hamilton	148,858	147,380	142,795	0.96	0.99	0.97
Total H-W	**204,783**	**212,319**	**211,196**	**1.03**	**1.04**	**0.99**
GTA Total	**2,237,166**	**2,379,180**	**2,419,753**	**1.08**	**1.06**	**1.02**

* TTS estimates

Exhibit 4 – GTA Employment Estimates

Location	1986 Estimate*	1991 TTS	1996 TTS	1996/1986	1991/1986	1996/1991
PD1-Metro	400,080	415,937	394,541	0.99	1.04	0.95
PD2-Metro	53,398	48,307	51,488	0.96	0.90	1.07
PD3-Metro	83,477	70,548	69,887	0.84	0.85	0.99
PD4-Metro	101,874	95,912	91,696	0.90	0.94	0.96
PD5-Metro	64,820	69,953	60,625	0.94	1.08	0.87
PD6-Metro	50,541	42,638	45,249	0.90	0.84	1.06
PD7-Metro	29,469	26,363	22,254	0.76	0.89	0.84
PD8-Metro	77,317	73,929	74,079	0.96	0.96	1.00
PD9-Metro	65,148	56,194	56,757	0.87	0.86	1.01
PD10-Metro	92,016	93,002	92,486	1.01	1.01	0.99
PD11-Metro	52,068	63,980	61,942	1.19	1.23	0.97
PD12-Metro	34,522	42,063	36,740	1.06	1.22	0.87
PD13-Metro	107,337	98,009	82,066	0.76	0.91	0.84
PD14-Metro	9,339	10,854	9,023	0.97	1.16	0.83
PD15-Metro	11,866	13,355	13,470	1.14	1.13	1.01
PD16-Metro	53,483	70,153	73,439	1.37	1.31	1.05
Total Toronto	**1,286,756**	**1,291,196**	**1,235,741**	**0.96**	**1.00**	**0.96**
Brock	2,987	2,360	2,190	0.73	0.79	0.93
Uxbridge	2,581	5,340	3,875	1.50	2.07	0.73
Scugog	3,623	4,387	4,205	1.16	1.21	0.96
Pickering	16,843	25,840	24,518	1.46	1.53	0.95
Ajax	13,097	15,087	18,808	1.44	1.15	1.25
Whitby	16,453	21,128	24,473	1.49	1.28	1.16
Oshawa	55,764	54,975	51,325	0.92	0.99	0.93
Clarington	12,093	10,508	11,945	0.99	0.87	1.14
Total Durham	**123,440**	**139,625**	**141,339**	**1.15**	**1.13**	**1.01**
Georgina	4,887	5,817	5,966	1.22	1.19	1.03
East Gwillimbury	1,392	2,159	3,044	2.19	1.55	1.41
Newmarket	13,583	15,448	20,664	1.52	1.14	1.34
Aurora	7,857	10,367	9,917	1.26	1.32	0.96
Richmond Hill	19,436	27,089	36,636	1.88	1.39	1.35
Whit.-Stouff.	5,524	6,760	6,129	1.11	1.22	0.91
Markham	58,846	83,149	93,782	1.59	1.41	1.13
King	4,199	4,339	3,880	0.92	1.03	0.89
Vaughan	48,121	62,728	81,084	1.68	1.30	1.29
Total York	**163,846**	**217,855**	**261,101**	**1.59**	**1.33**	**1.20**
Caledon	5,849	7,579	9,300	1.59	1.30	1.23
Brampton	74,114	86,847	91,233	1.23	1.17	1.05
Mississauga	197,808	246,377	269,906	1.36	1.25	1.10
Total Peel	**277,771**	**340,804**	**370,439**	**1.33**	**1.23**	**1.09**
Halton Hills	12,355	8,760	9,990	0.81	0.71	1.14
Milton	10,185	11,946	13,454	1.32	1.17	1.13
Oakville	42,817	46,408	54,251	1.27	1.08	1.17
Burlington	44,019	52,934	55,191	1.25	1.20	1.04
Total Halton	**109,377**	**120,048**	**132,886**	**1.21**	**1.10**	**1.11**
Flamborough	7,154	5,864	7,209	1.01	0.82	1.23
Dundas	4,483	3,875	6,217	1.39	0.86	1.60
Ancaster	3,706	5,733	5,446	1.47	1.55	0.95
Glanbrook	2,264	2,271	2,086	0.92	1.00	0.92
Stoney Creek	12,793	13,872	14,722	1.15	1.08	1.06
Hamilton	157,349	145,761	133,244	0.85	0.93	0.91
Total H-W	**187,748**	**177,376**	**168,925**	**0.90**	**0.94**	**0.95**
GTA Total	**2,148,938**	**2,286,904**	**2,310,431**	**1.08**	**1.06**	**1.01**

NOTES: Total Employment (Full time and part time including work at home)

Excludes employed people who live outside the GTA

*1986 estimate = $\frac{\text{(1991 Employment) * (1986 first work trips) * (1986 global home end work trip rate)}}{\text{(1991 first work trips) * (1991 global home end work trip rate)}}$

The TTS data reflect the recession's influence on the distribution of employed labour force (at place of residence) and employment (at place of work). The numbers demonstrate that the recession's effects were concentrated in Toronto and Hamilton-Wentworth, municipalities that both saw absolute declines in employment after 1989. The TTS employment estimates suggest that the four suburban Regional Municipalities saw continued employment increases over the decade despite the recession.

Toronto experienced substantial declines in employed labour force between 1986 and 1991 and between 1991 and 1996, despite continued increases in population as shown in Exhibit 1.

Exhibits 5 and 6 summarize trends in Employed Labour Force (ELF)/ population ratios for men and women by Regions of residence and the GTA. Exhibit 5 documents reduced male labour force activity across the GTA and the relatively larger job losses in Toronto where the ELF/population ratio fell from 0.63 in 1986 to 0.53 in 1996.

In contrast, while female labour force activity fell overall during the 1986-1996 period, female labour force participation continued to increase in Hamilton-Wentworth, Durham and Halton between 1986 and 1991, and the Halton female ELF/population ratio continued to increase after 1991, as shown in Exhibit 6.

The trends in labour force activity shown in Exhibits 5 and 6 mask some important differences in labour force activity trends by age and gender, as illustrated in Appendix A.

Whereas there was a consistent pattern of reduced employment among workers of both genders aged 15-24 across the GTA and among males 55-64, Toronto (and Hamilton-Wentworth) experienced much higher levels of unemployment among males in the peak working ages, 25-34, 35-44 and 45-54.

For example, the proportion of Toronto males aged 35-44 with full time jobs fell from 93.3% to 81.4% between 1986 and 1996. In contrast, the comparable GTA-wide decline was from 95% (in 1986) to 86.6% in 1996. By 1996 more than 90% of males aged 35-44 who lived in the suburban Regional Municipalities held full-time jobs, despite the recession with Halton having the highest full time labour force participation. An estimated 94% of Halton males aged 35-44 held full time jobs in 1996, down from 97.5% in 1986.

The data for the period 1986 to 1996 suggest the stalling of the longstanding trend toward increased female labour force participation, particularly after 1991. The decline in the employment/population ratios for women resulted from reduced employment among women aged 15-24 in all areas, and declining employment among women in other age groups as well, particularly in Toronto and Hamilton-Wentworth.

Exhibit 5 – Changes in Employed Labour Force/Population for Males

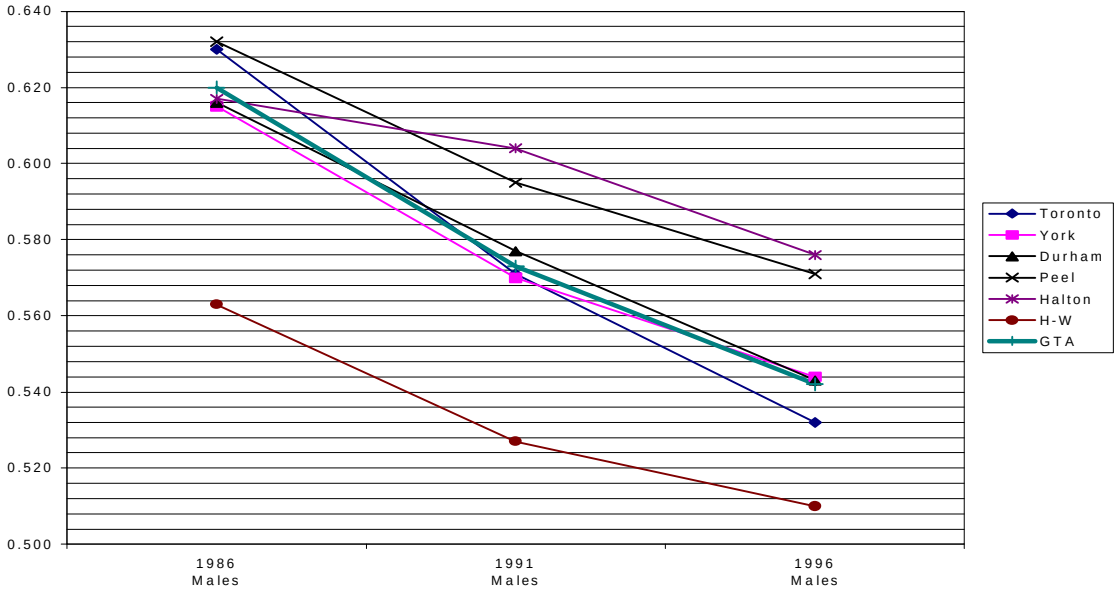
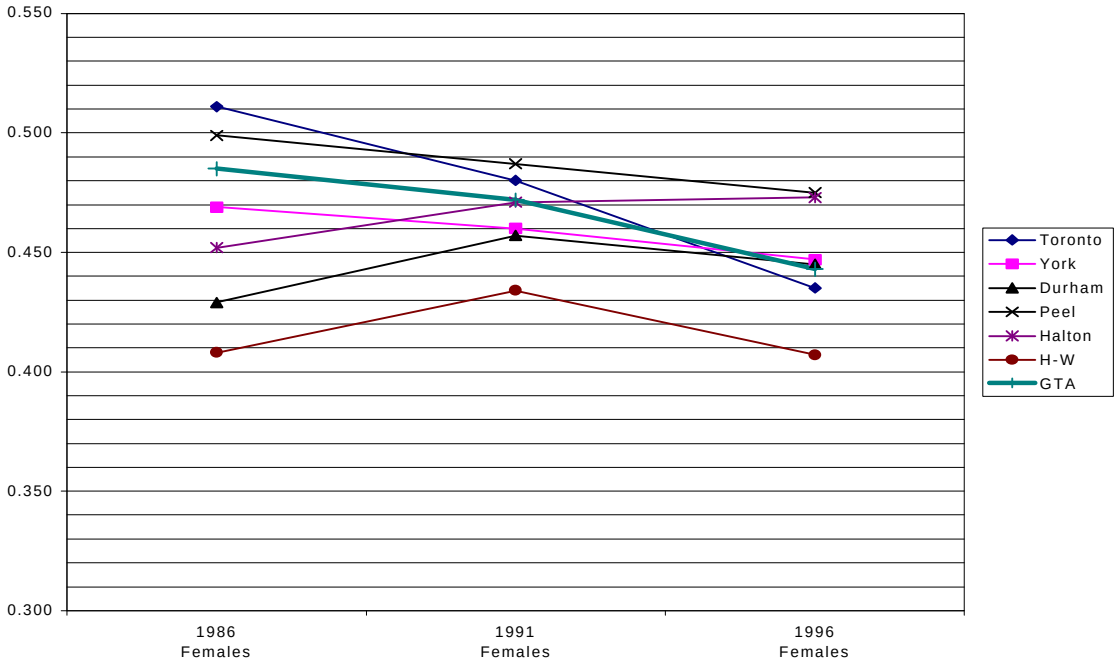


Exhibit 6 – Changes in Employed Labour Force/Population Ratios for Females



Toronto saw declines in employment/population ratios for women of all ages after 1991, and declines for all age groups except the 45-54 cohort, relative to 1986.

Hamilton-Wentworth saw increases in employment/population ratios for women in all age groups between 1986 and 1991 but declines after 1991, particularly among women aged 45-54 and 55-64.

Labour force activity levels among women over the age of 25 living in the Suburban Regions varied. Total employment/population ratios were generally stable among women aged 35-44 during the 1986-96 period but for women aged 55 and older, labour force activity declined during this period.

2.3 Changes in the Student Population

The changes in labour force participation described above would be expected to influence the numbers of persons who are enrolled as full-time students. It is reasonable to assume that when the job market is tight, more people stay in school. This is indeed the case. Among both men and women, there was an increase in the percentage of persons aged 15-19 and 20-24 who were reported to be full time students between 1986 and 1996.

The percentage of GTA males aged 15-19 who were full time students increased from 85% in 1986 to 90% by 1996 while the percentage of GTA females of the same age who were full time students increased from 84% to 92%.

For GTA males aged 20-24, the percentage who were full time students increased from 26% to 37% between 1986 and 1996, while the comparable increase for GTA females of this age was from 23% to 39%.

Similar increases were observed for men and women living in Toronto, Durham, York and Peel regions. In Halton and Hamilton-Wentworth, women in the 15-19 and 20-24 age groups showed consistent increases in school attendance.

3. OTHER RELEVANT SOCIO-DEMOGRAPHIC FACTORS

The TTS also provides data on other relevant socio-demographic factors that would be expected to influence travel behaviour. These include the changing age structure of the population, possession of driver's licences, and auto availability, three factors that have all been shown to influence transit (and auto) trip making and mode choice behaviour.

3.1 Changing Age Structure

The changing age structure is summarized in Exhibits 7a, 7b and 7c for Toronto, the four suburban Regions and Hamilton-Wentworth, respectively. The population of a given area changes as a result of natural increase (births minus deaths), migration, an issue discussed briefly in the following paragraphs, and the aging of those people who remain within the area.

The TTS does not provide information on the intra-urban, provincial, national and international migration patterns that influence the distribution of population across the study area. However, the Metro Toronto Planning Department reported on "Migration Trends 1981-1993" in a brief Metro Facts report dated December 1994. This report documented large net movements from Toronto to the Regional Municipalities, especially during the 1986-1993 period, and a large inflow of new immigrants to Toronto. During the period 1986-1993, international migration to Toronto increased while inter-provincial migration changed from positive (in 1986-1989) to negative, starting in 1990 as the recession took hold.

For example, between 1992 and 1993, approximately 61,000 persons came to Toronto from other countries while about 35,000 left Toronto for the four GTA regions excluding Hamilton-Wentworth, 5,000 moved to the Hinterland (the Counties adjacent to the GTA) and 2,000 migrated to other Ontario destinations. New immigrants continued to come to Toronto after 1989, despite the poor employment prospects.

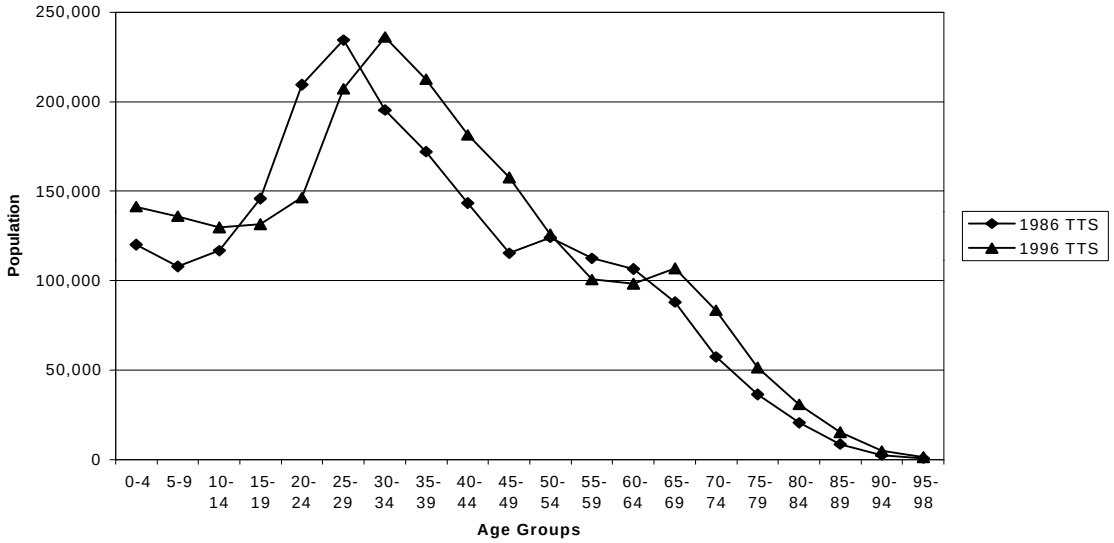
The age structure of migrants arriving in Toronto and leaving Toronto influenced the age structure of both Toronto and the suburban Regions. The Metro Planning report suggests that most net in-migrants during the 1986-1993 period were 18-24 years of age and most net out-migrants were aged 24-44 or children under age 18.

The changing distribution of people and workers resulting from these migration patterns, and the decentralization of jobs, had important implications for trip making and travel patterns, as discussed in Section 4.

Toronto's population aged by about 5 years over the 1986-1996 period, as a result of the combined effects of natural increase, migration patterns and the aging of Toronto residents. The observed changes in Toronto's age structure resulted in

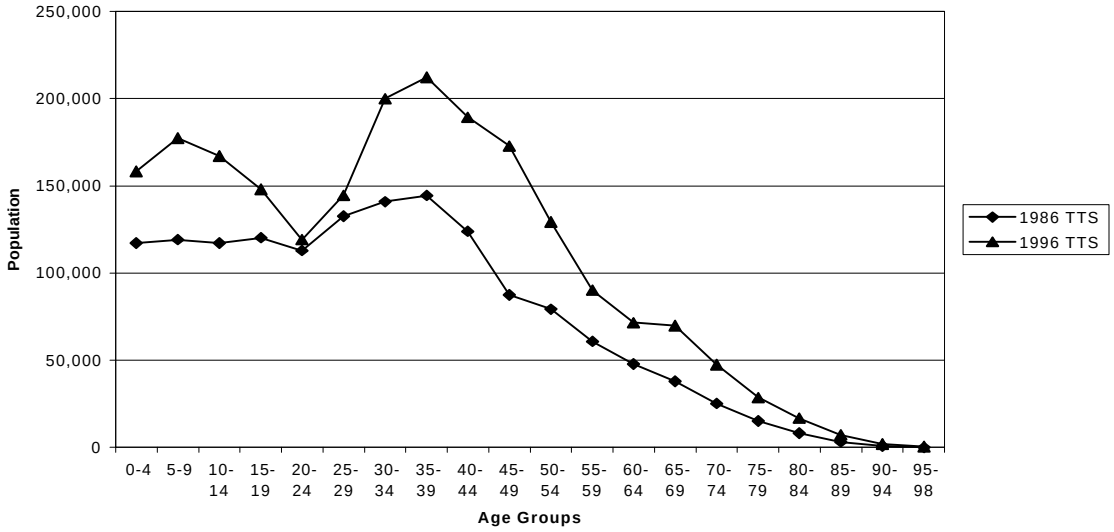
increases in the population aged 30 to 45, and over 65 years of age and reductions in the numbers aged 15 to 29, with the largest decline in the population aged 20-24. The "echo boom" increased the number of Toronto residents under the age of 15.

Exhibit 7a – Toronto's Evolving Age Structure



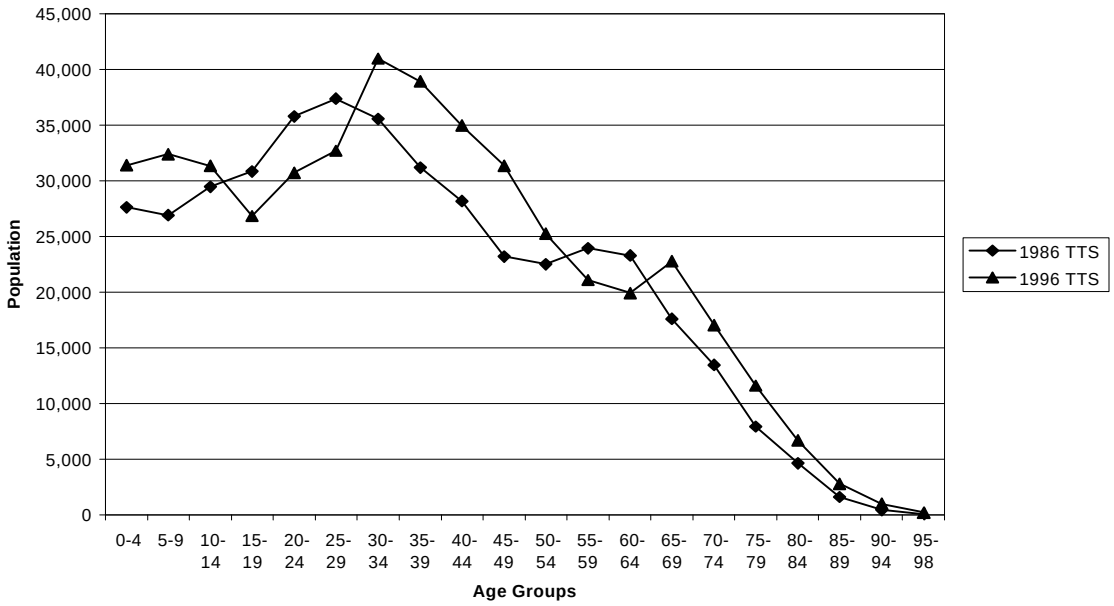
The suburban Regions saw increases in population across all age groups except the 20-24 cohort. This is the group that is most likely to migrate to Toronto or other cities to work or attend university. The largest increases in the Regions' populations were for children (under 19) and for adults aged 30 to 54, as would be expected given the migration patterns discussed above.

Exhibit 7b – The Evolving Age Structure of the Suburban Regions



The Hamilton-Wentworth age profiles show the effect of the aging of the population, with a 10 year shift in the 1986 age profile, and the effect of the "echo boom".

Exhibit 7c – The Evolving Age Structure of Hamilton-Wentworth



Aging and Mode Choice

The 15-19 and 20-24 age groups are the peak transit users, as shown in Exhibits 8a, 8b and 8c, which summarize transit trip rates by age and gender for Toronto, the 4 suburban Regions, and Hamilton-Wentworth. Declines in the size of these groups in Toronto and Hamilton would be expected to reduce transit use, all other things being equal. The decline in the proportion of the suburban population in the 15-24 age group would also tend to reduce the increases in transit ridership that would be expected given the high growth observed in the suburban regions during the decade. As shown in Exhibit 7b, all age groups except the 20-24 cohort, grew rapidly between 1986 and 1996. The 20-24 age group barely increased.

Similarly, increases in the number and/or proportion of the population between the ages of 35 and 44, the peak ages for auto driver trip rates, would tend to increase auto travel relative to transit ridership.

Exhibit 8a – 1996 Transit Trip Rates by Gender for Toronto

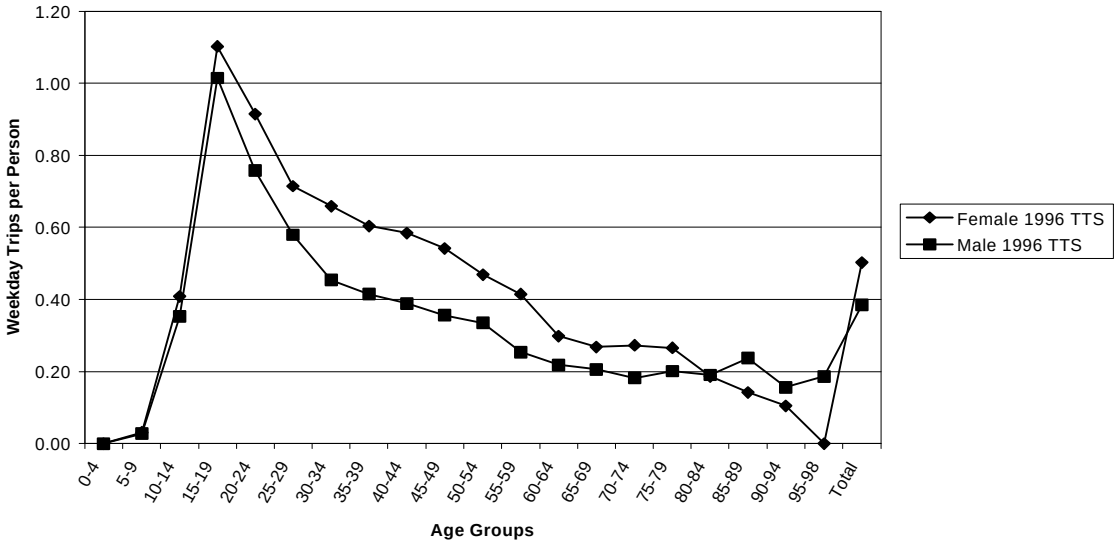


Exhibit 8b – 1996 Transit Trip Rates by Gender for Durham, Halton, Peel and York

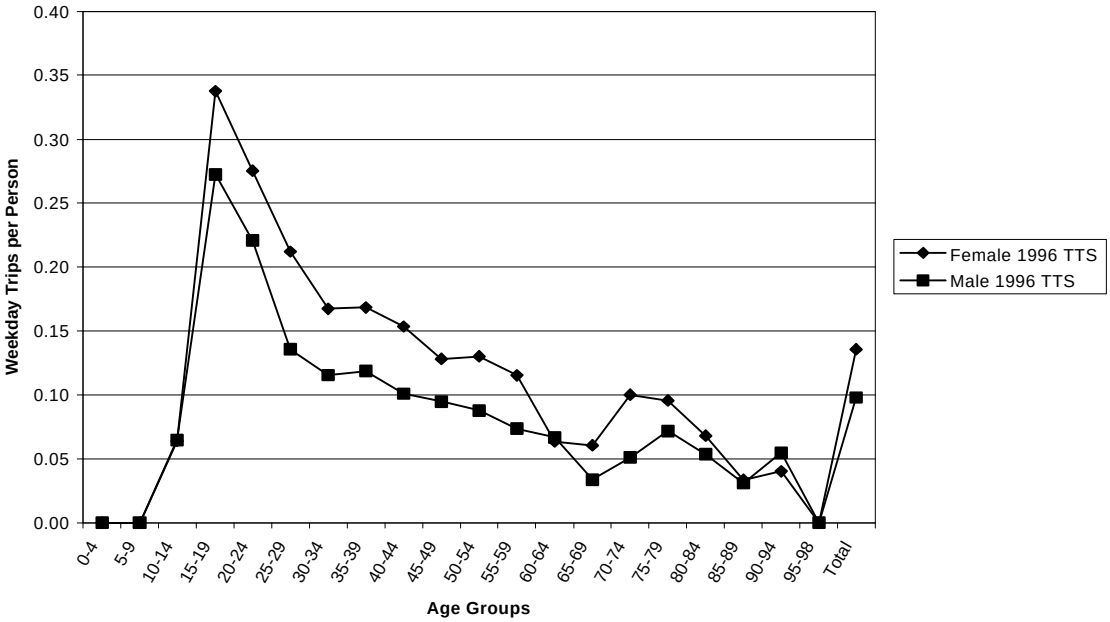
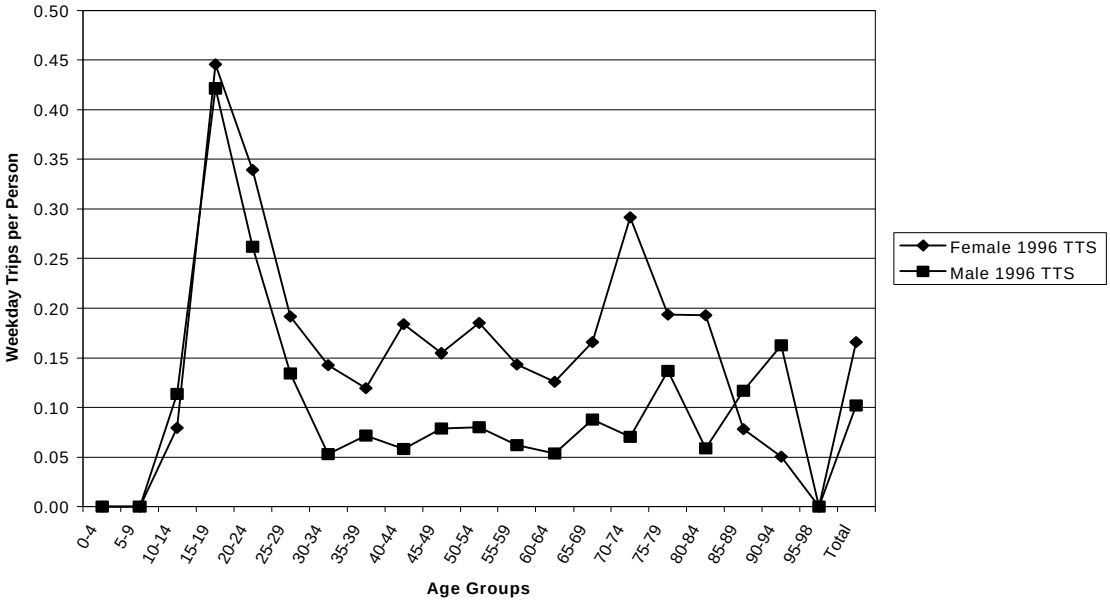


Exhibit 8c – 1996 Transit Trip Rates by Gender for Hamilton - Wentworth



3.2 Drivers Licensing Trends

The proportion of the GTA and Hamilton-Wentworth population in possession of a valid driver's licence declined among men and women after 1991. The major declines in driver's licence possession were among men and women under the age of 21, particularly among students. However, there were continued increases in the proportion of working women who possessed a valid driver's licence in Toronto, Hamilton-Wentworth and the suburban regions.

Whereas 93% of Toronto males working full-time had a drivers licence in 1986 and 1996, the percentage of Toronto women working full time with a drivers licence increased from 72% to 78%.

Across the study area, driver's licence possession among working women is approaching the levels observed for working males. In 1996, 89% of Hamilton-Wentworth women working full-time had a licence (compared to 98% for their male counterparts). The comparable figures for the four suburban Regional Municipalities were 92.6% for women with full time jobs and 98% for men.

Decline in driver's licensing among students and part-time workers appears to primarily reflect economic conditions because those who are working full time were more likely to drive in 1996 than in 1986 and 1991. However, the new Ministry of Transportation "graduated licence" requirement may have played a role in the observed declines in licensing among persons 16, 17, and 18 years of age. The requirements associated with graduated licensing may be resulting in some young people putting-off getting their licences.

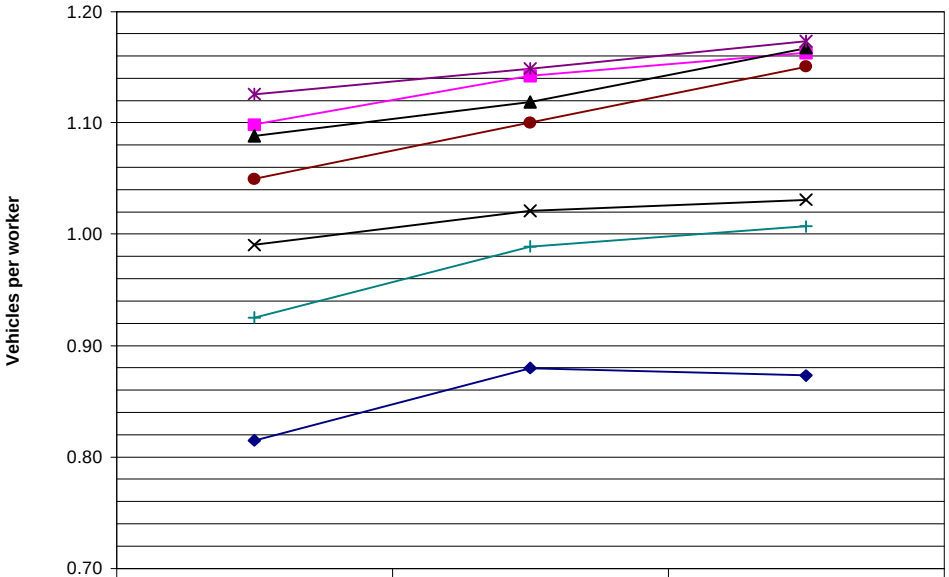
The observed reductions in driver's licences among young men and women would normally be expected to lead to increased transit use, especially in Toronto, where transit services are relatively competitive. However, the available data on driver's licensing, suggest that once people obtain a full-time job they are more likely to get a driver's licence.

3.3 Vehicle Availability

The TTS data suggest a small decline in auto availability between 1986 and 1996. Vehicles per household declined from 1.41 in 1986 to 1.35 in 1996 for the GTA and Hamilton-Wentworth as a whole, and in particular, from 1.21 to 1.07 for Toronto. The number of households without a car in the GTA and Hamilton-Wentworth area increased from 15% in 1986 to 17% in 1996. However, vehicles per worker increased over the same period from 0.93 to 1.01, as labour force activity decreased relative to the total population and the total number of vehicles[3]. The number of vehicles per worker increased across the study area, as shown in Exhibit 9, rising 7% in Toronto, 10% in Hamilton-Wentworth, and between 4% to 7% in the Suburban Regions.

[3] Whereas the GTA population increased by approximately 864,000 between 1986 and 1996, the number of personal use vehicles grew by about 370,000.

Exhibit 9 – Personal Use Vehicles per Worker – 1986 – 96



	1986 TTS	1991 TTS	1996 TTS
Metro	0.81	0.88	0.87
Durham	1.10	1.14	1.16
York	1.09	1.12	1.17
Peel	0.99	1.02	1.03
Halton	1.13	1.15	1.17
Hamilton-Wentworth	1.05	1.10	1.15
Total	0.93	0.99	1.01

The fact that the number of vehicles per worker increased in each region as a whole does not necessarily translate into an increase in the availability of vehicles for making trips to and from work since some vehicles are owned by households with no workers. Further analysis would be required to determine the number of vehicles available to households with no workers, 1 worker, 2 workers etc.

4. TRANSPORTATION IMPLICATIONS - CHANGING TRAVEL PATTERNS

The land use and socio-demographic changes identified in Sections 2 and 3 led to the significant changes in work trip generation, distribution and mode choice over the 1986 to 1996 period. There were also changes in travel behaviour during this period that do not relate in any obvious way to the observed land and socio-demographic changes. The following sub-sections outline changes in travel behaviour and, where appropriate, discuss how and why these changes came about.

4.1 Work Trip Generation

The volume and timing of peak period trips was directly influenced by the changing nature of work trips. For example, the reduced labour force participation and increased part-time work.

The trends in labour force activity resulted in proportionately fewer work trips due to the decline in labour force participation and the shift from full-time to part-time work. However, during the 1986-1996 period changes in the number of work trips per worker were also noted. There was an increase in the numbers of first work trips per day for both full time and part-time workers.

The GTA and Hamilton-Wentworth data suggests a 5% increase in first work trips for male and female full time workers, a 14% increase in first work trips for part time males and an 8% increase in first work trips for part time females.

The Toronto results are consistent with the observed GTA and Hamilton-Wentworth pattern. The Toronto data show a 6% increase in work trip making for men and women with full time jobs, a 16% increase for men with part-time jobs and a 9% increase for women with part-time jobs.

The increase in first work trips per worker between 1986 and 1996 suggests that these workers are working more days per week, on average, although the increases for full-time workers are relatively small at plus 5 or 6%.

Nevertheless, part-time workers across the study area, particularly males, are working more days per week and this is resulting in more travel than would be expected based on observed changes in ELF/population ratios.

4.2 Work and School Trip Start Times

Profiles of work and school trip start times are distinct for different Regions. Appendix B documents the 1996 trip start times distribution for each region by

trip purpose and mode. In light of earlier discussions on the changes in the nature of work and school trips, one would expect shifts in work and school trip start times.

The shift in home-based work and school trip times were compared to isolate changes in trip start times between 1986 and 1996 in Exhibits 10a to 10f. The observed shifts in work start times appear to relate to increase in part time work and, possibly, avoidance of congestion (in the suburban Regions) where there are some significant increases in the percentage of trips starting before 6:30 in the morning.

The Toronto data shows a large decline in work trips starting between 6:00 and 8:00 and a consistent increase in work trips starting between 8:30 and 15:00 hours. Toronto saw a similar, but larger decline between 15:30 and 17:00 and increase after 17:30 (until 23:30). The Toronto changes reflect the large job losses in the Toronto area and the shift from full-time to part-time work.

Exhibit 10a – Shifts in Trip Start Times for Toronto 1986 to 1996

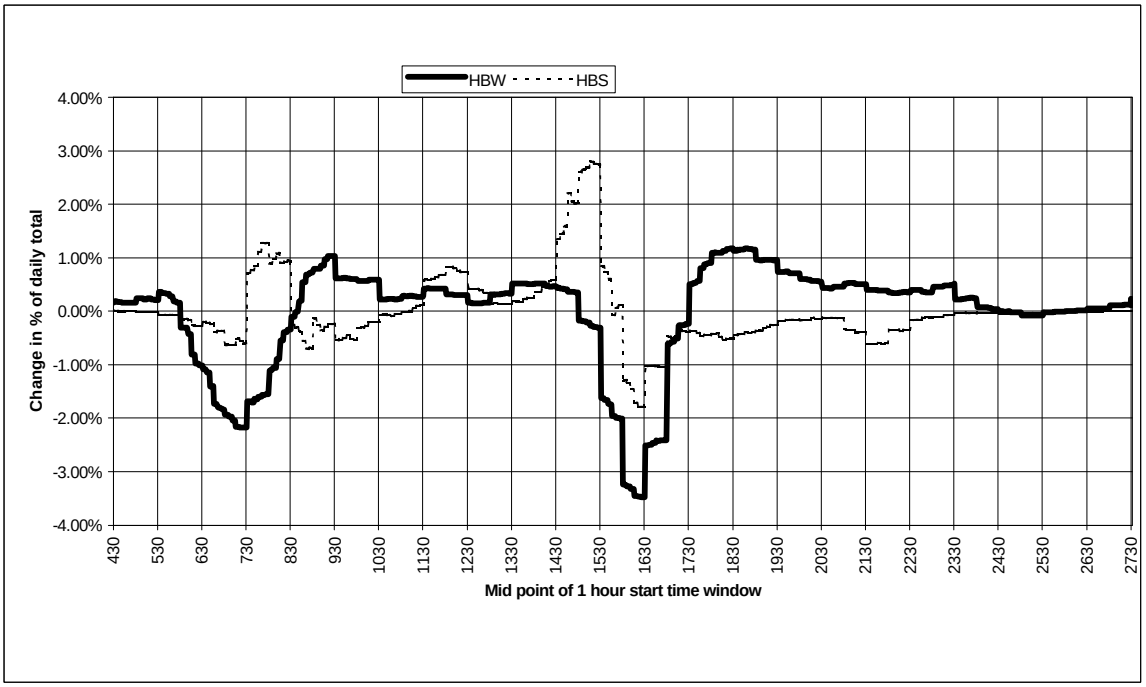


Exhibit 10b – Shifts in Trip Start Times for Durham 1986 to 1996

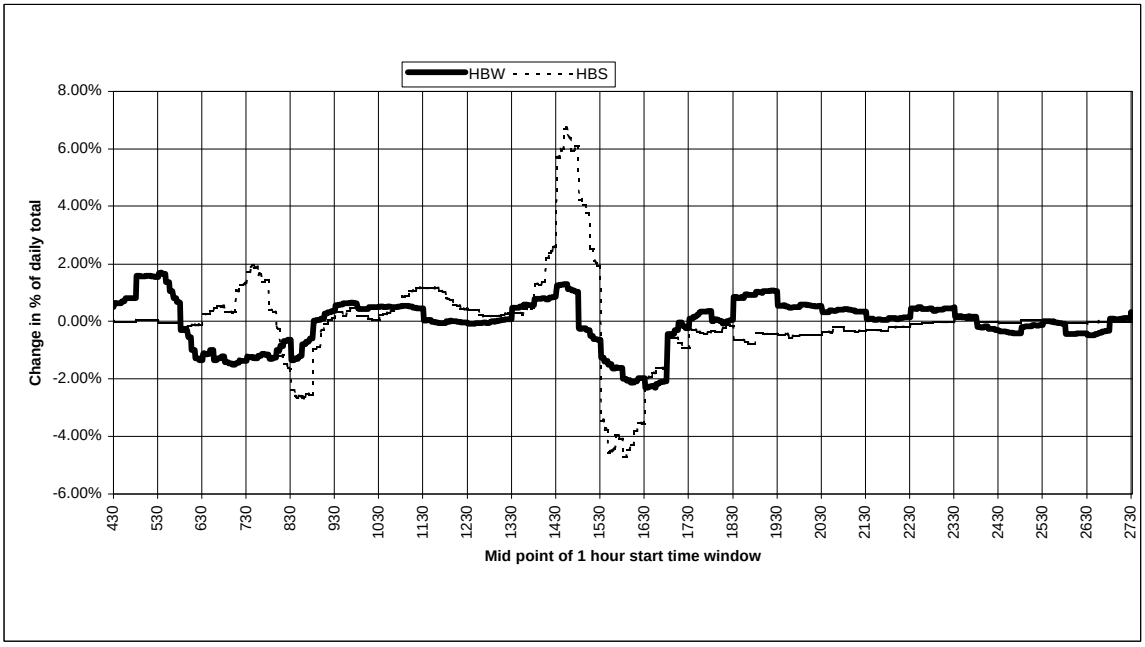


Exhibit 10c – Shifts in Trip Start Times for York 1986 to 1996

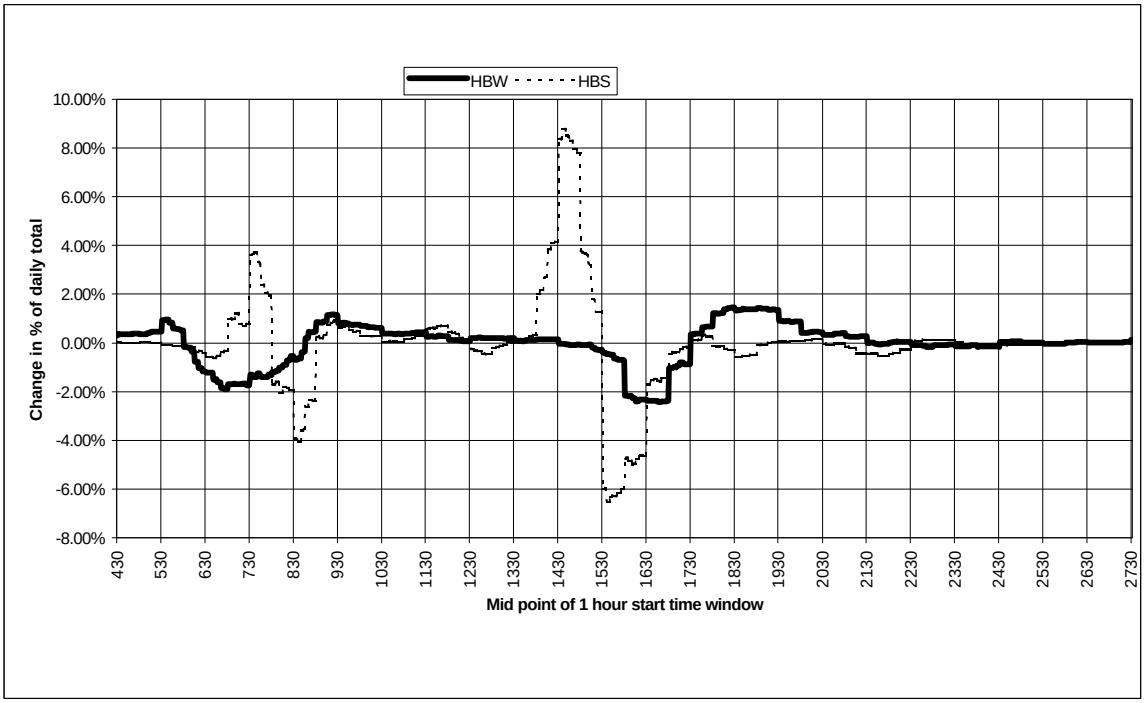


Exhibit 10d – Shifts in Trip Start Times for Peel 1986 to 1996

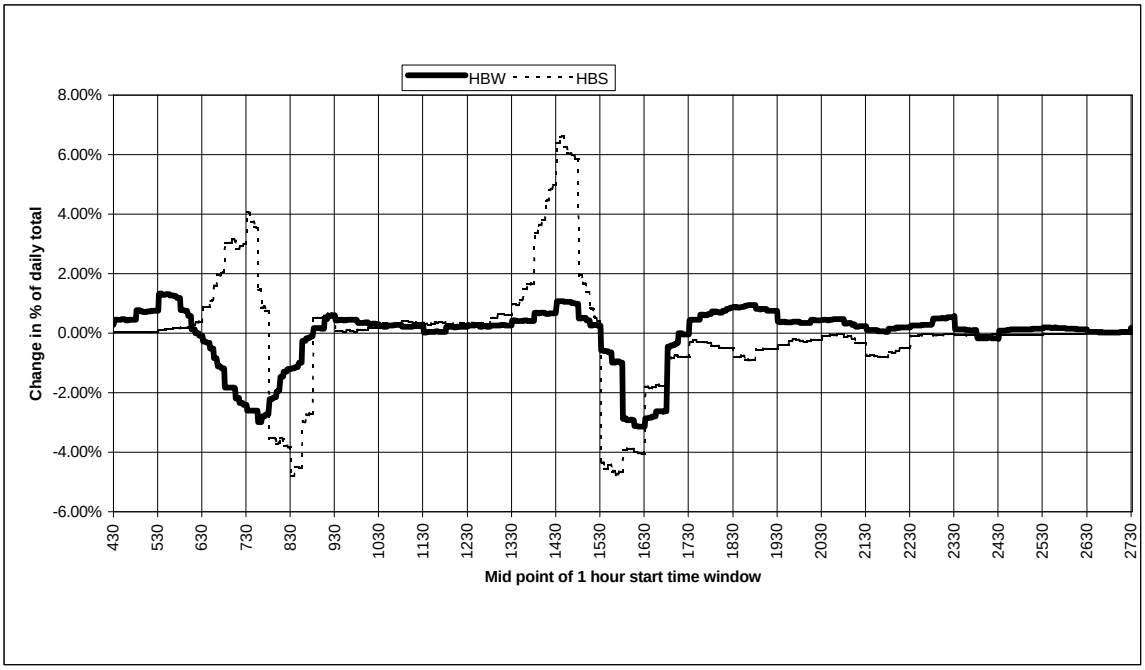


Exhibit 10e – Shifts in Trip Start Times for Halton 1986 to 1996

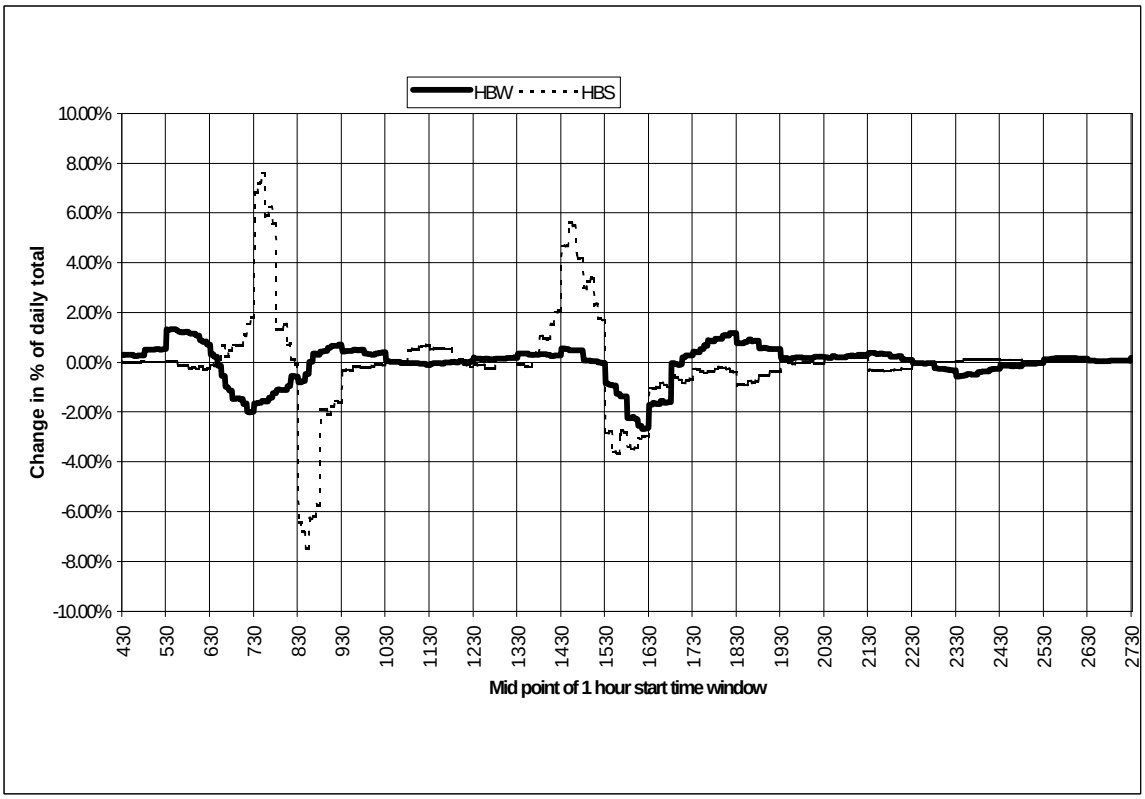
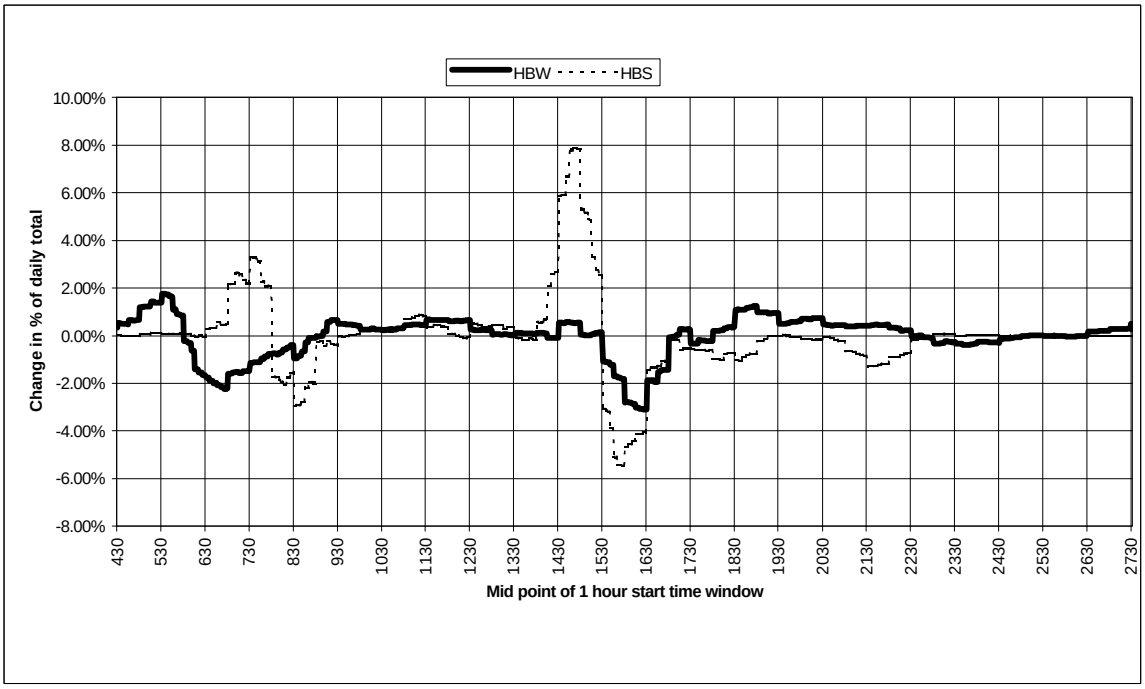


Exhibit 10f – Shifts in Trip Start Times for Hamilton-Wentworth 1986 to 1996



The four suburban Regions and Hamilton-Wentworth did not experience the large PM peak decline seen for Toronto but the other patterns are generally similar to the Toronto case.

The observed shifts in school start time reflect changes in school hour policies during the early 1990's that were largely driven by pressures to reduce the costs of school busing. Whereas schools typically started at 9:00 AM and ended at 3:15 or 3:30 in 1986, school boards now stagger school start times between 8:00 and 9:00 AM and school end times between 2:30 and 3:30.

4.3 Work Trip Distribution

Job losses in Toronto and Hamilton combined with continued population and employment growth in the suburban Regions led to changes in live-work relationships and commuting patterns. Changes in work trip distribution reflect changing live-work relationships that are associated with the migration patterns discussed in Section 2.4.

Changes in work travel distribution are summarized in Exhibits 11a to 11g which illustrate the absolute and percentage changes in first work trips destined to 7 destinations across the GTA including: Toronto Planning District 1 (Toronto's

Central Area), Planning District 13 (West-central Scarborough area), Oshawa, Vaughan, Mississauga, Oakville, and (the City of) Hamilton.

The recessionary employment losses in Toronto and Hamilton and related out-migration trends appear to have had a dramatic impact on travel patterns, especially to Toronto and Hamilton (and especially for internal Toronto trips serviced by TTC Subway).

In the Toronto case, both the Central Area (PD1) and PD 13 workers have moved to the surrounding Regions reducing travel within Toronto and creating new inbound flows to Toronto.

Growing suburban employment areas such as Mississauga and Vaughan are attracting large numbers of Toronto and Regional residents leading to increased outbound and cross-town traffic (south York to Mississauga, and Brampton to Mississauga). These changes in travel patterns are consistent with a reduced role for the TTC and, in the case of work travel to PD1, an increased role for GO Rail services, as long as Toronto's Central Area continues to thrive.

Hamilton exhibits a similar pattern to Toronto, reflecting an absolute loss of jobs, the out-migration of Hamilton workers to Ancaster and Stoney Creek, and a reduced flow from Burlington, which has historically been strongly oriented to jobs in Hamilton.

While fewer Burlington residents commuted to Hamilton in 1996 than in 1986, Oakville's growing employment attracted more workers from Burlington, Hamilton and Peel Region.

The observed changes in trip distribution suggest increased reliance on the private auto to serve the emerging travel patterns and a reduced role for transit.

Exhibit 11a - Changes in Work Travel Distribution to PD1 in Toronto

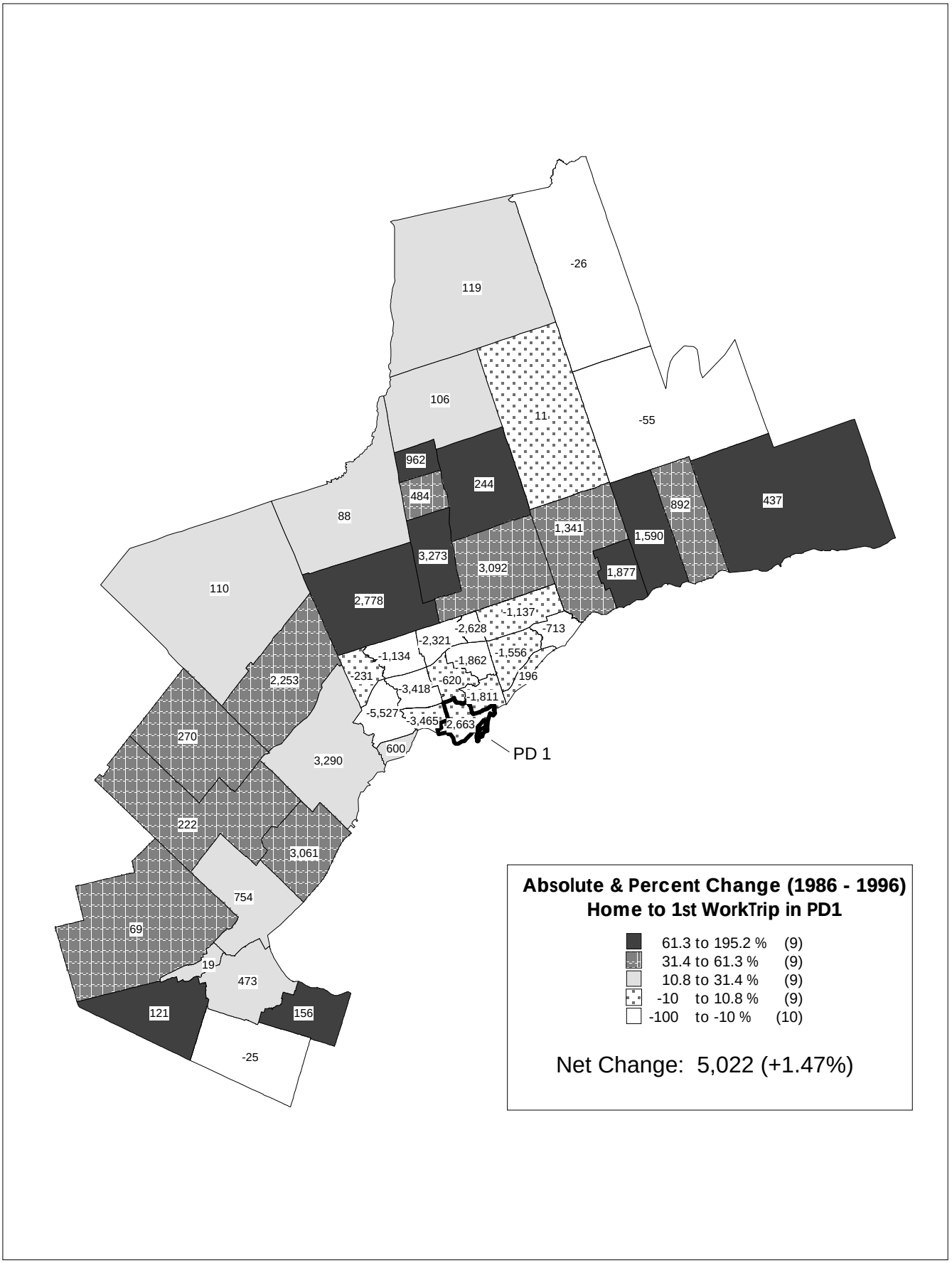


Exhibit 11b - Changes in Work Travel Distribution to PD13 in Toronto

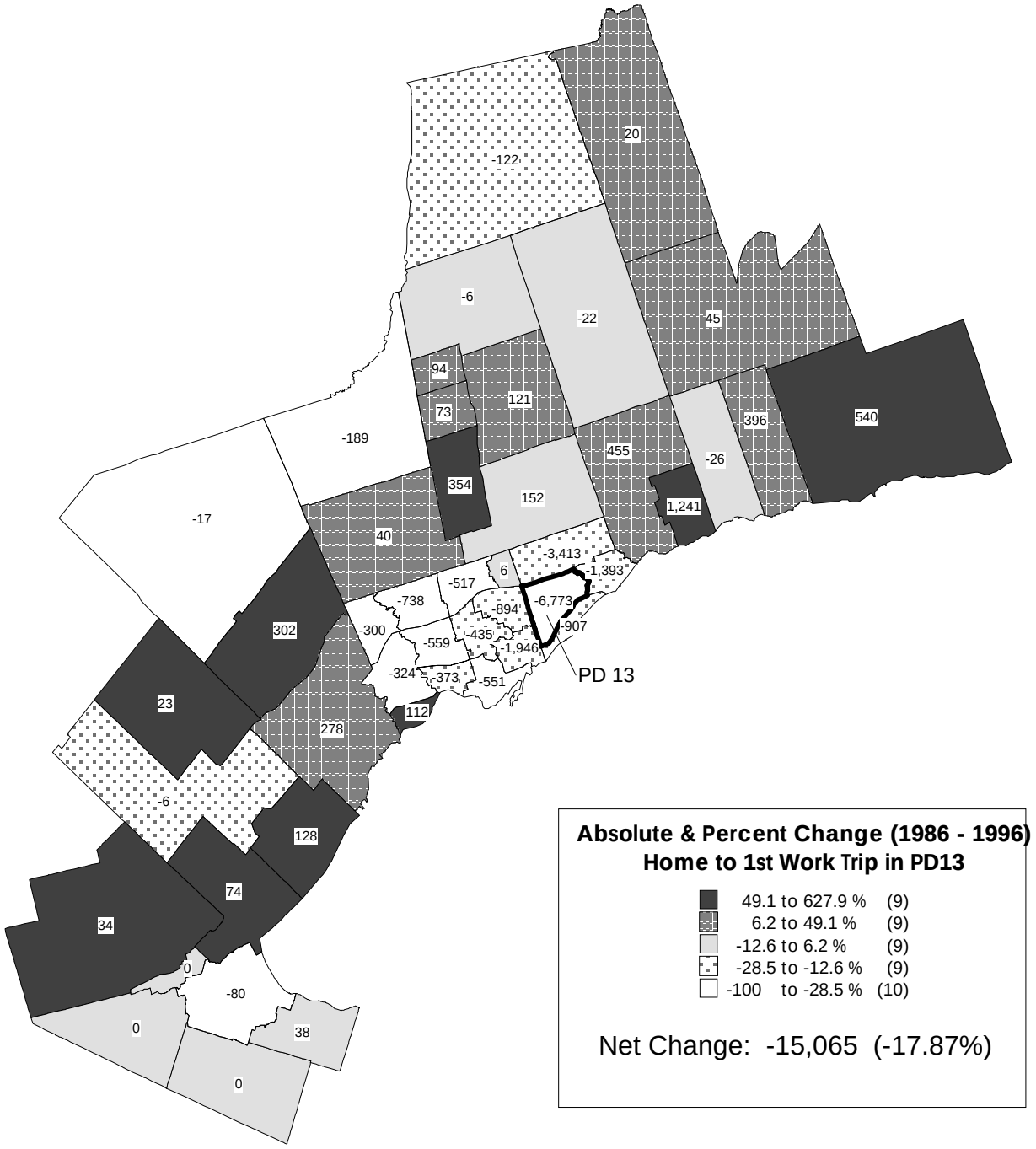


Exhibit 11c - Changes in Work Travel Distribution to Oshawa

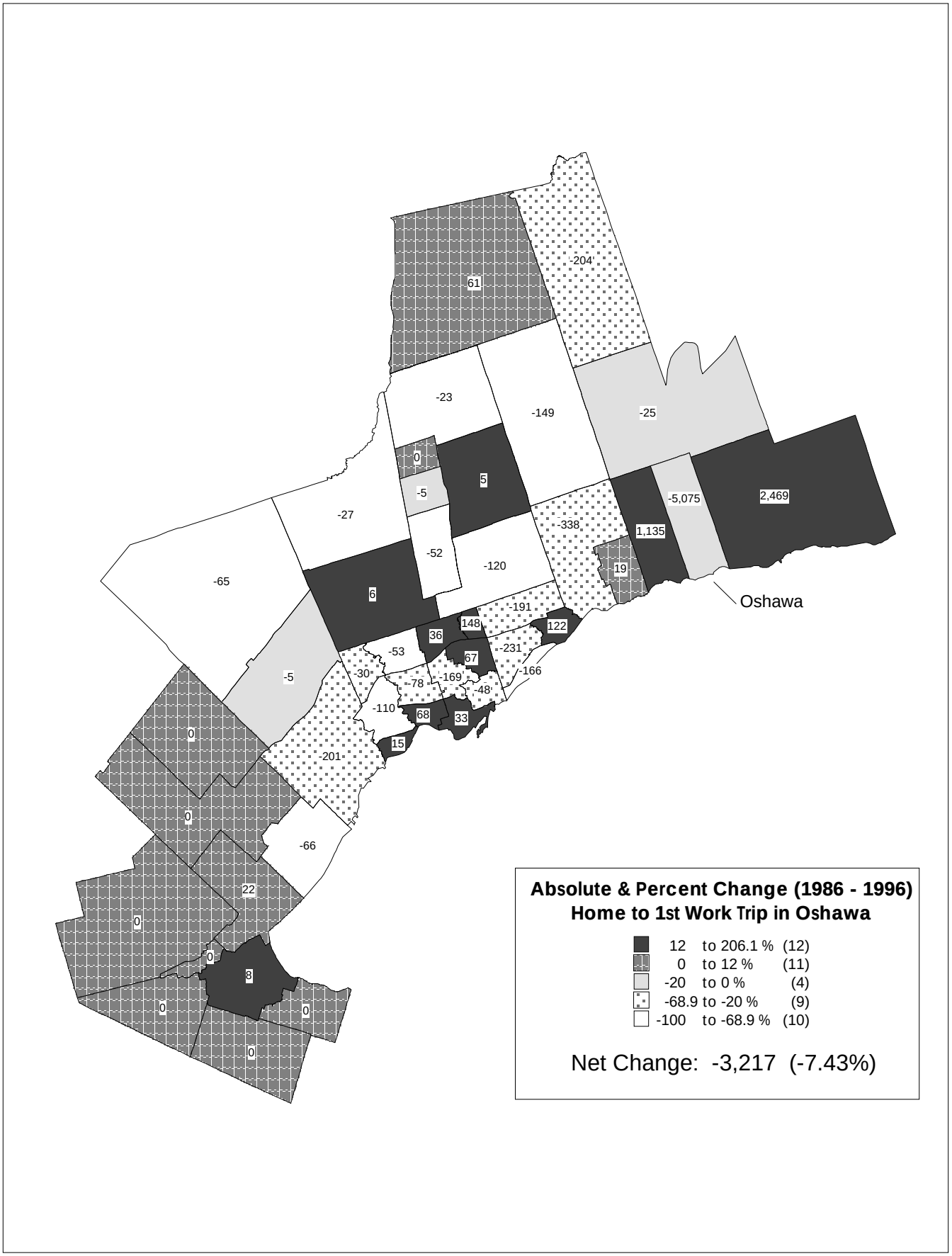


Exhibit 11d - Changes in Work Travel Distribution to Vaughan

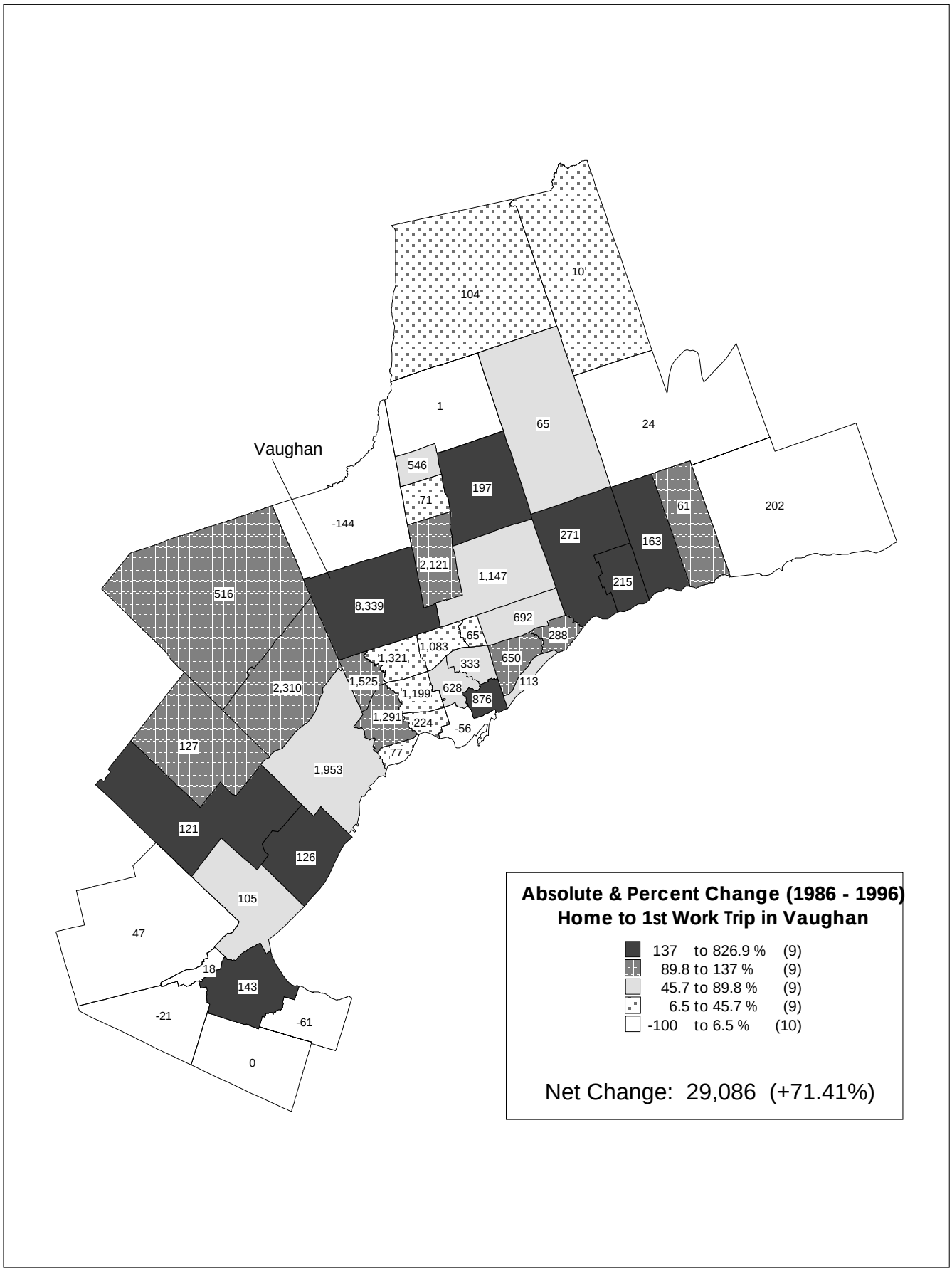


Exhibit 11e - Changes in Work Travel Distribution to Mississauga

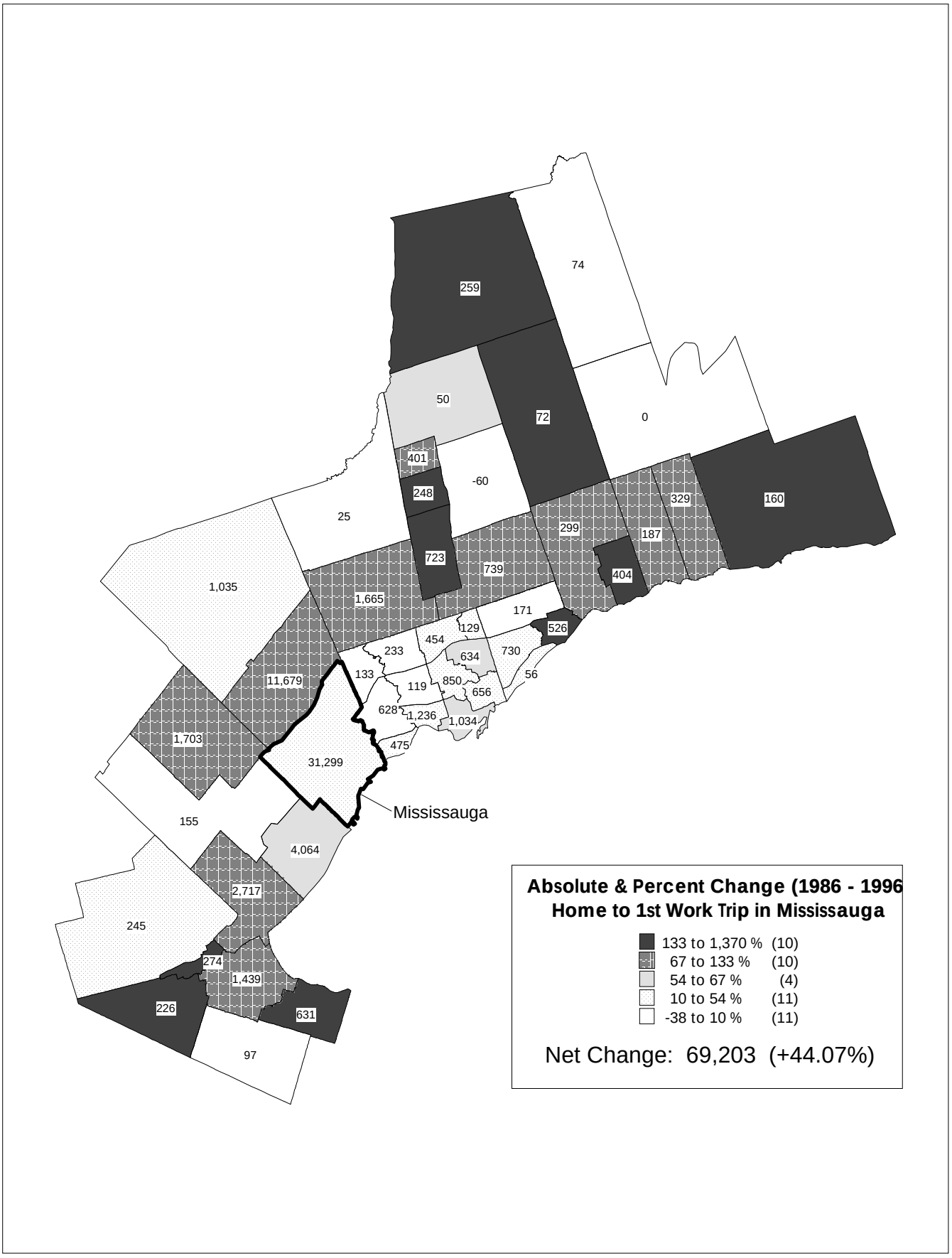


Exhibit 11f - Changes in Work Travel Distribution to Oakville

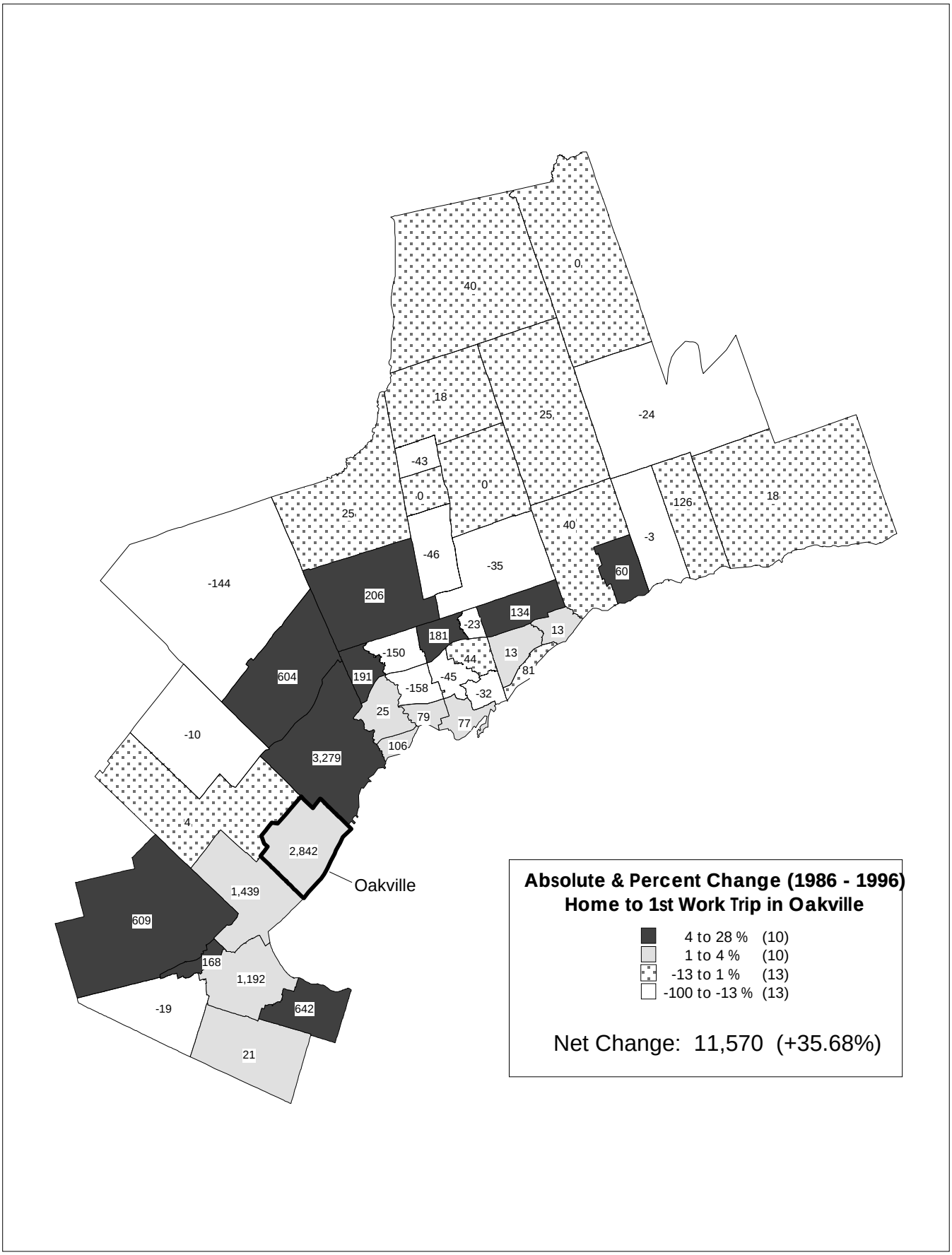
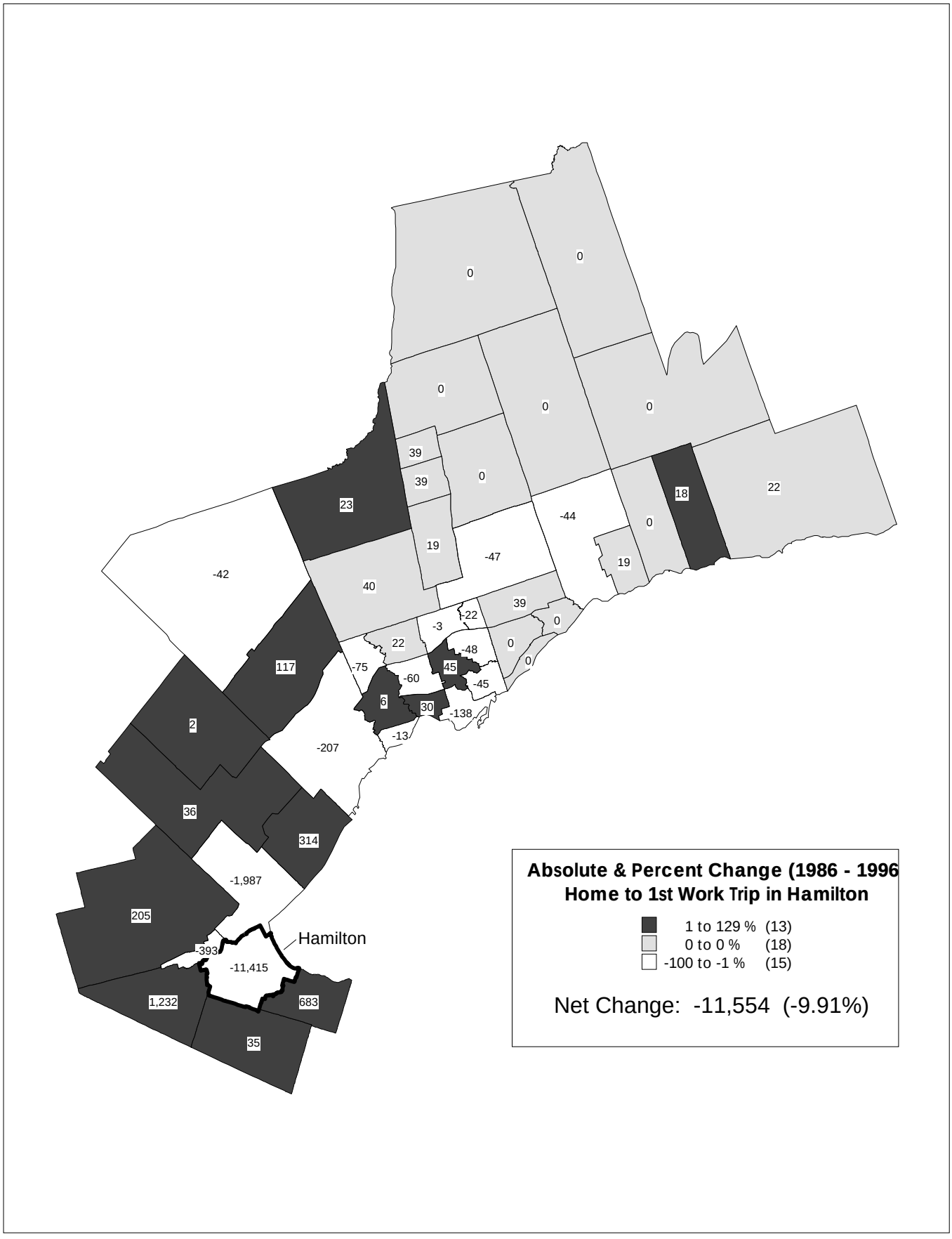


Exhibit 11g - Changes in Work Travel Distribution to Hamilton



4.4 Transit Use

Changes in work trip distribution would be expected to reduce transit mode splits (and transit trip rates), which should be reflected in age-specific mode splits and transit trip rates.

Transit Mode Splits

Exhibits 12a and 12b summarize mode splits by age for GTA males and females. These summaries show significant declines in mode split among 11-15 year and 55+ year (for males) and general declines across all age groups for women.

Transit mode split declines occurred in Toronto, Hamilton, South York Region and Halton while Mississauga, Brampton and Durham mode splits were more or less stable. Mississauga saw higher transit use among young people, due to a shift from school bus to transit passes (for school trips).

Exhibit 12a – Mode Splits by Age for GTA Males

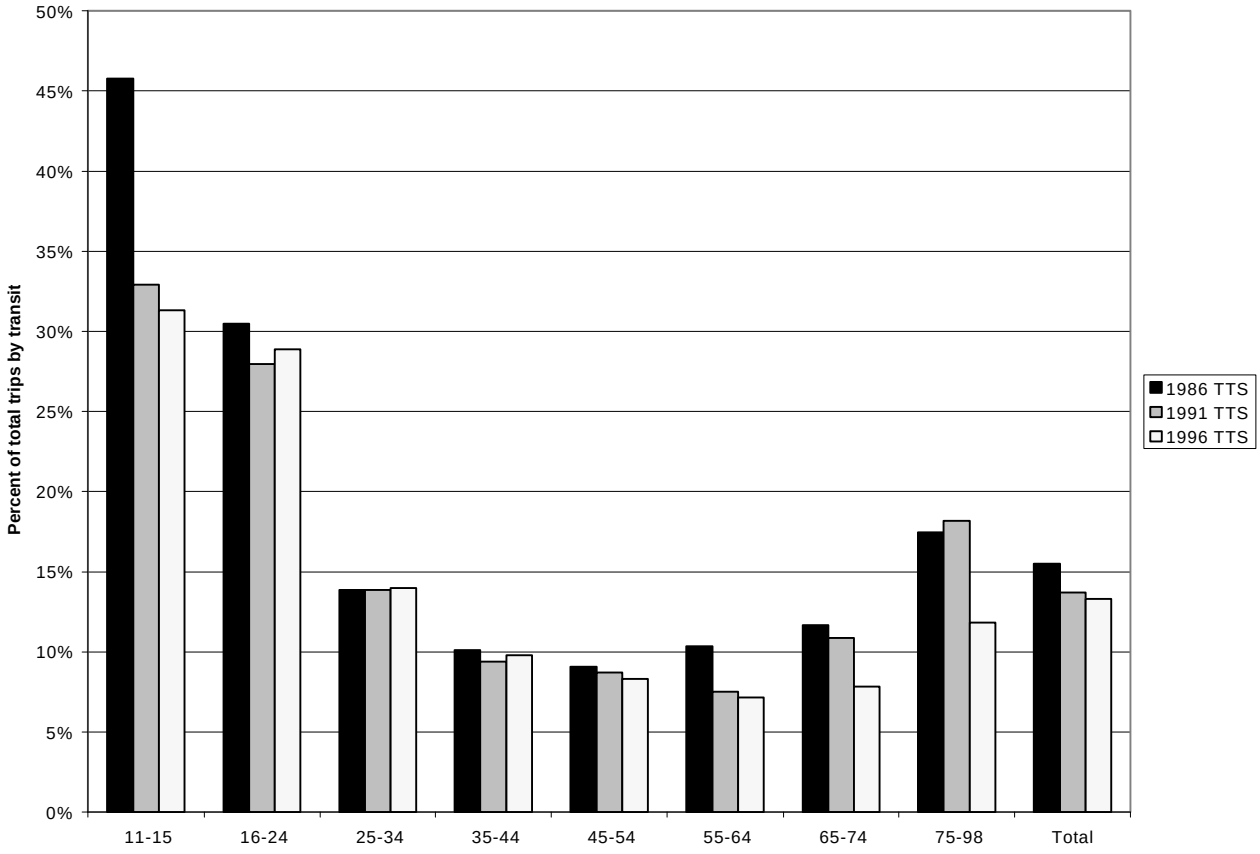
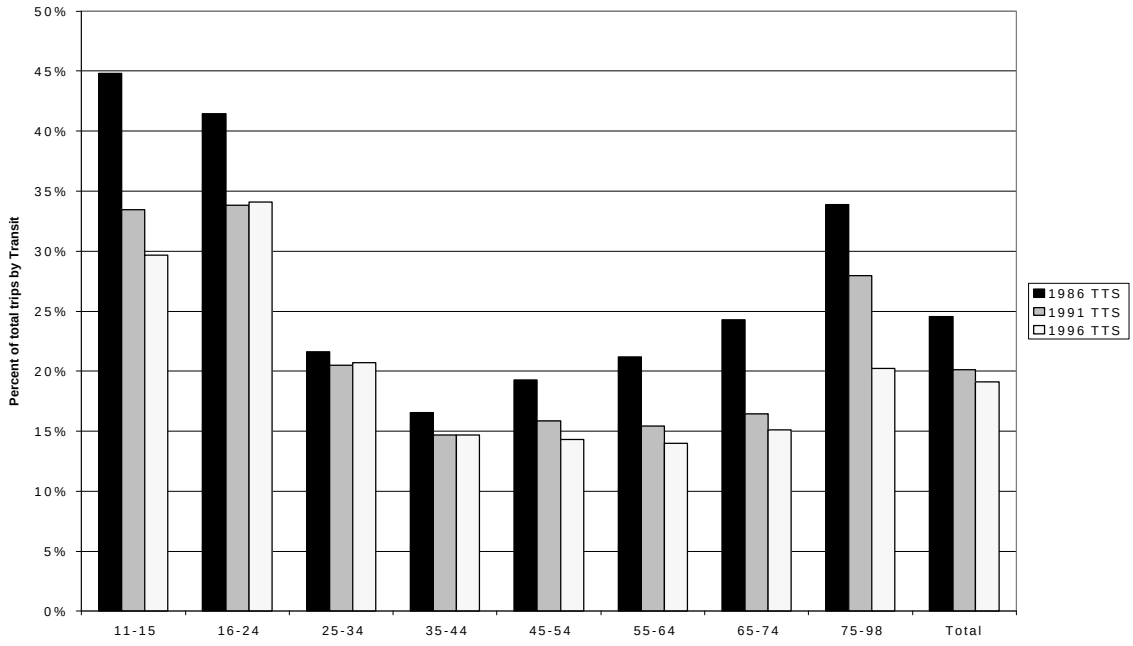


Exhibit 12b – Mode Splits by Age for GTA Females



Transit Trip Rates

Exhibits 13a and 13b document changes in transit trip rates per capita for women and men living in Toronto between 1986 and 1996. These exhibits show very similar trip rates for the two time periods for ages up to 50-54 but indicate declines for those aged 55 and above.

Exhibit 13a – Changes in Transit Trip Rates for Men in Toronto 1986 to 96

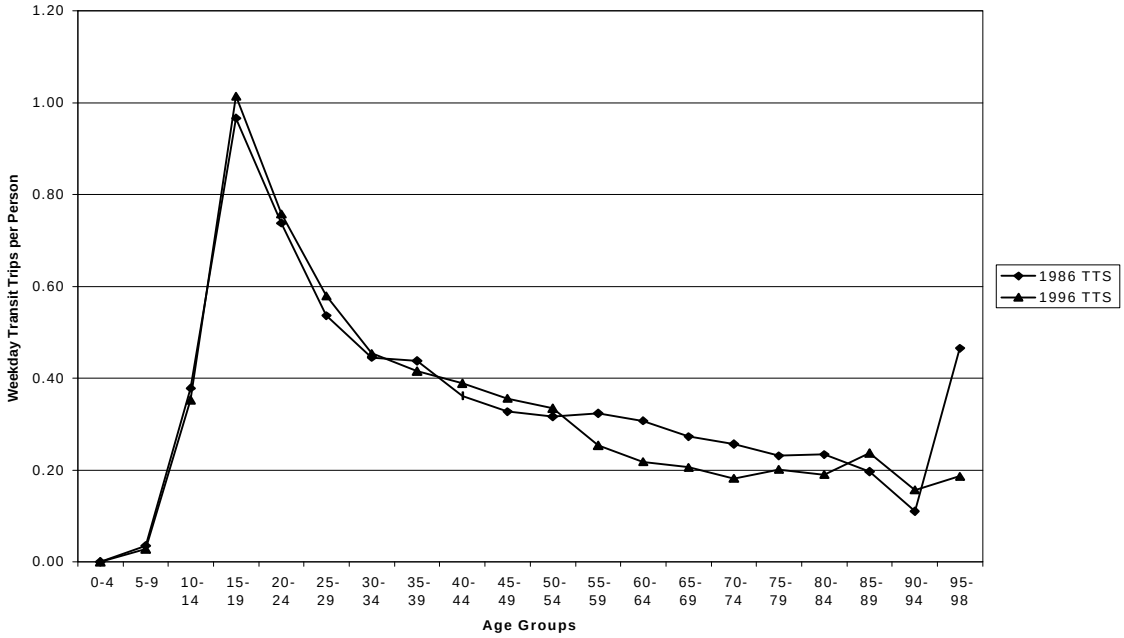
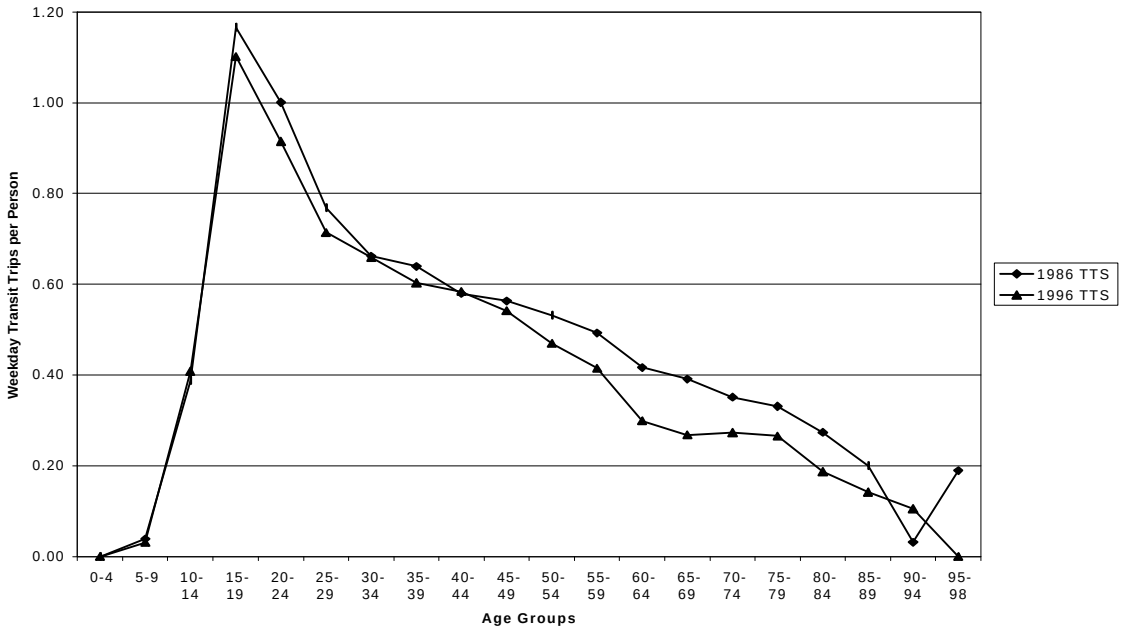


Exhibit 13b – Changes in Transit Trip Rates for Women in Toronto 1986 to 96



When the declines in transit trip rates are combined with changes in age structure (Exhibits 7a to 7c), the TTS data indicates small losses in ridership in 1991 (-27,000) and 1996 (-9,000), despite the continued growth of Toronto's population.

These losses are apparently explained by the declines in the number of transit trips made by the 15-24 age group for both women and men, as shown in Exhibits 14a and 14b. The loss of ridership by the 15-19 and 20-24 age groups were only partially off-set by increases in ridership by the growing 30-49 age groups.

Exhibit 14a – Evolving Age Structure of Female Transit Trip Making in Toronto 1986-96

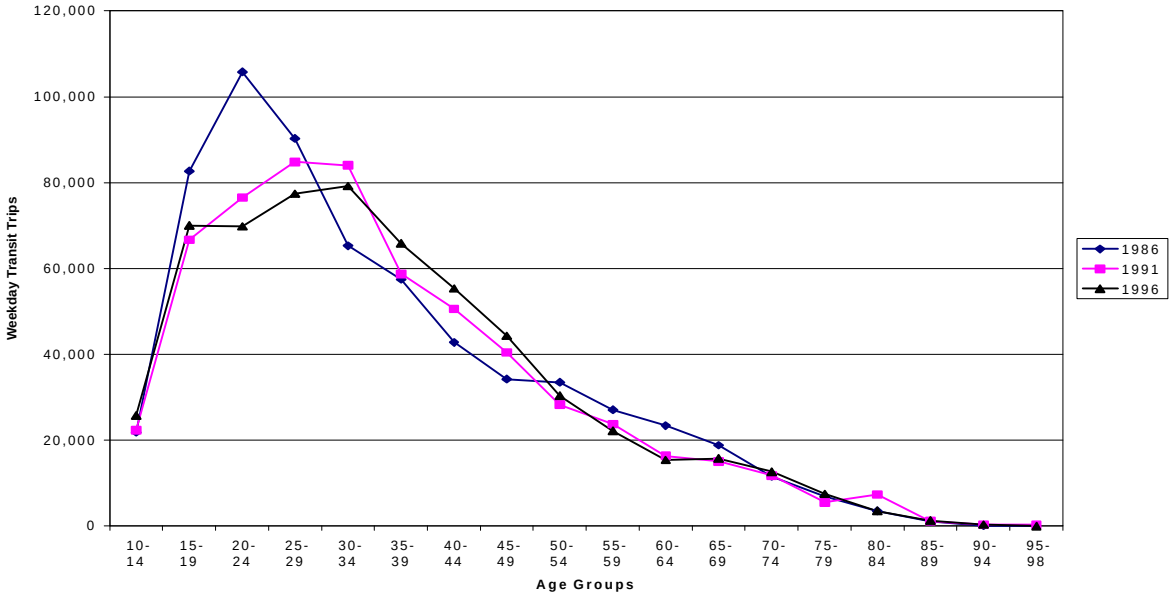
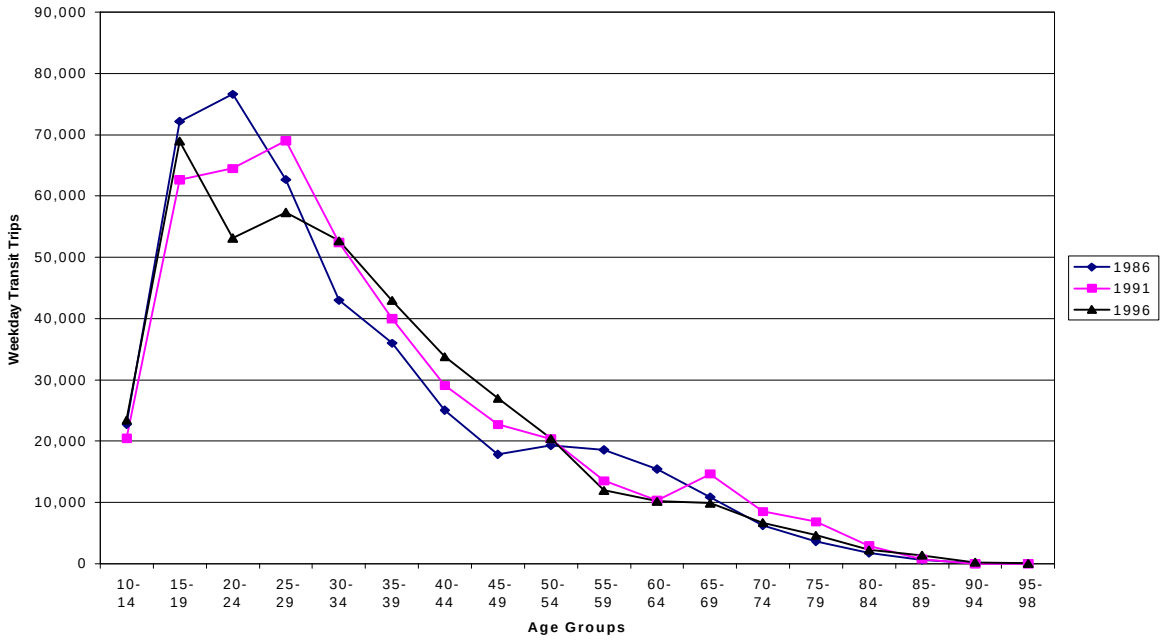


Exhibit 14b – Evolving Age Structure of Male Transit Trip Making in Toronto 1986-96



Exhibits 15a, 15b, 16a and 16b illustrate changes in transit trip rates by age for men and women living in the four suburban Regions and Hamilton-Wentworth. The suburban Regions also experienced transit trip rate declines for the over 50 age groups for both men and women.

A large decline was also observed in the transit trip rates for women aged 20-24 with transit trips per day per person falling from 0.37 to 0.27.

The pattern of transit trip rates for Hamilton-Wentworth shows general declines in transit use for men and women in most age groups. The largest declines are for women 15-19 and between 50 and 65 and among men aged 65-74.

Exhibit 15a – Changes in Transit Trip Rates for Men in Durham, Halton, Peel and York

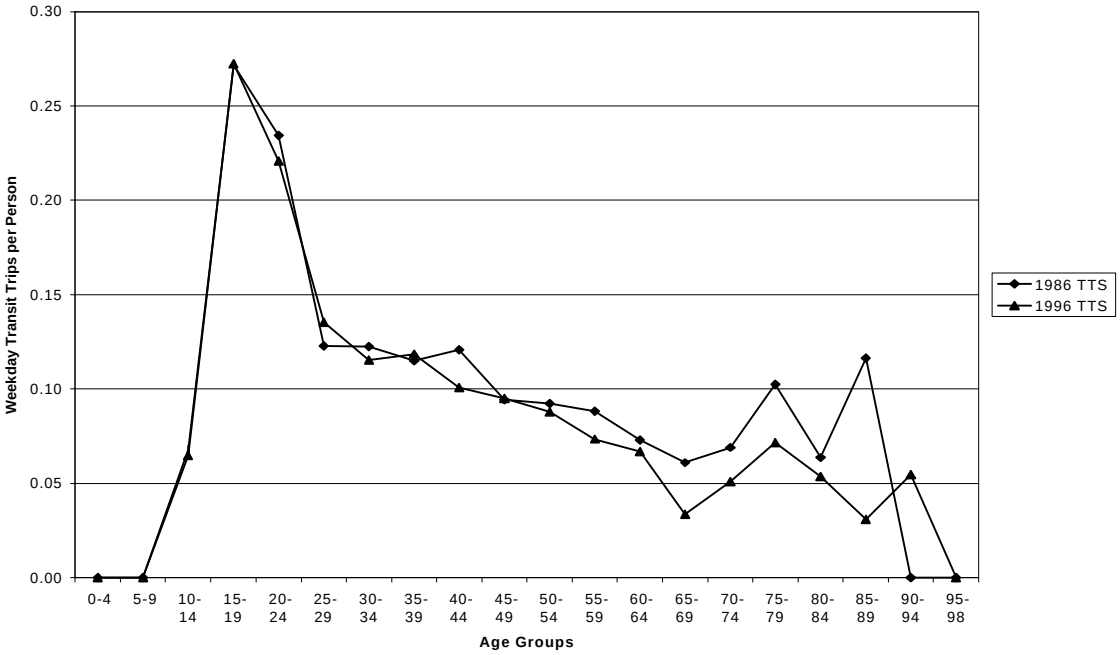


Exhibit 15b – Changes in Transit Trip Rates for Women in Durham, Halton, Peel and York

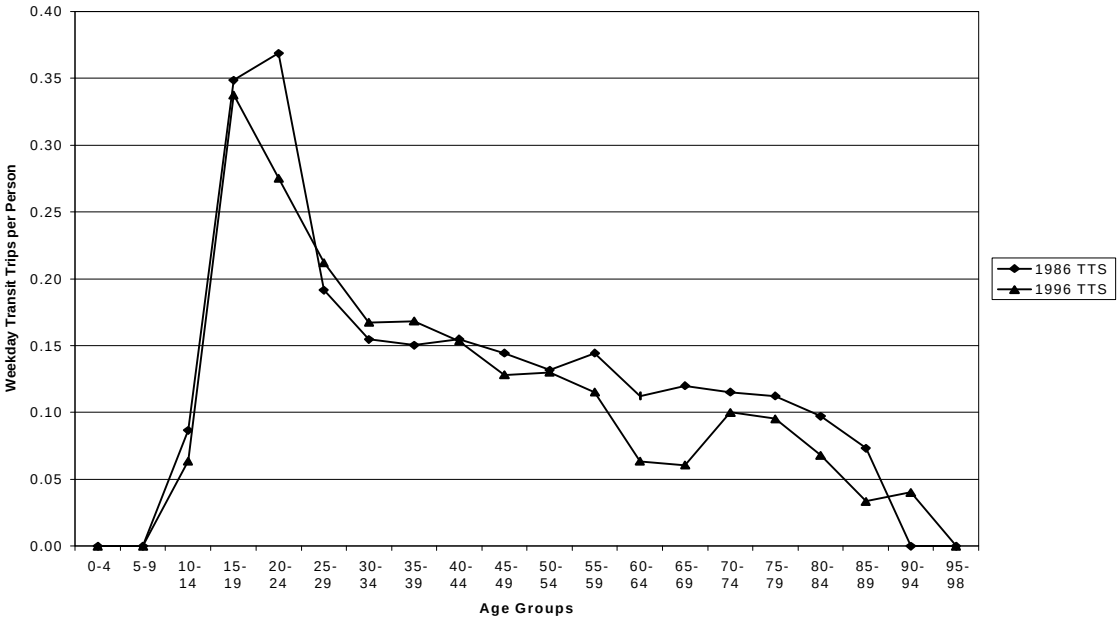


Exhibit 16a – Changes in Transit Trip Rates for Men in Hamilton-Wentworth

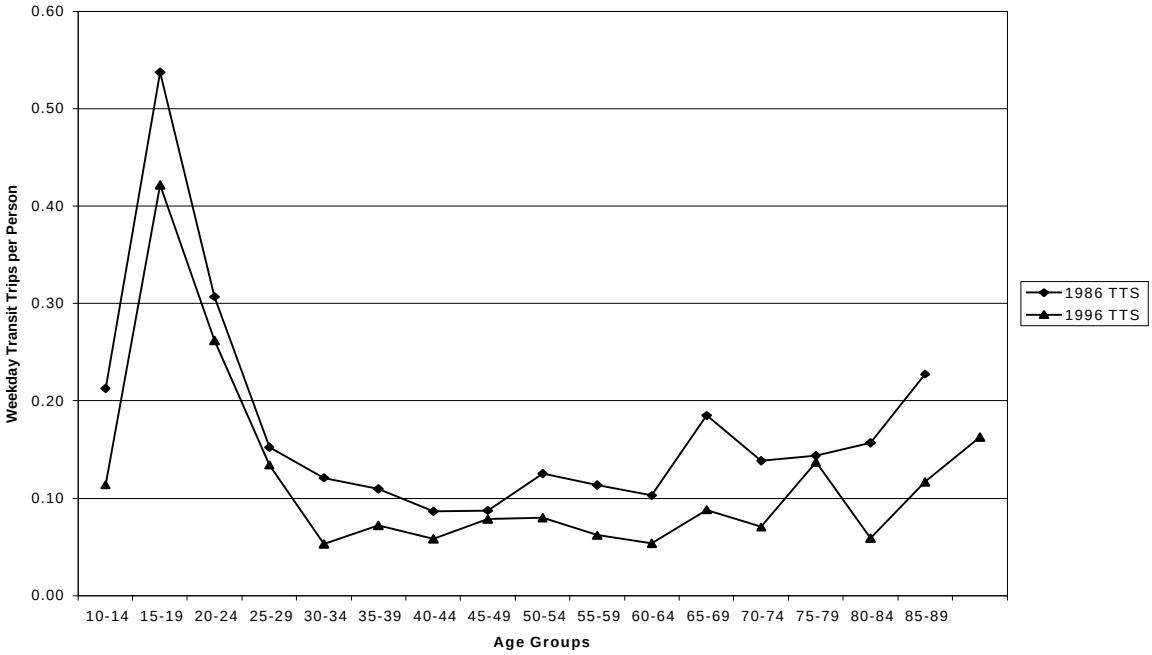
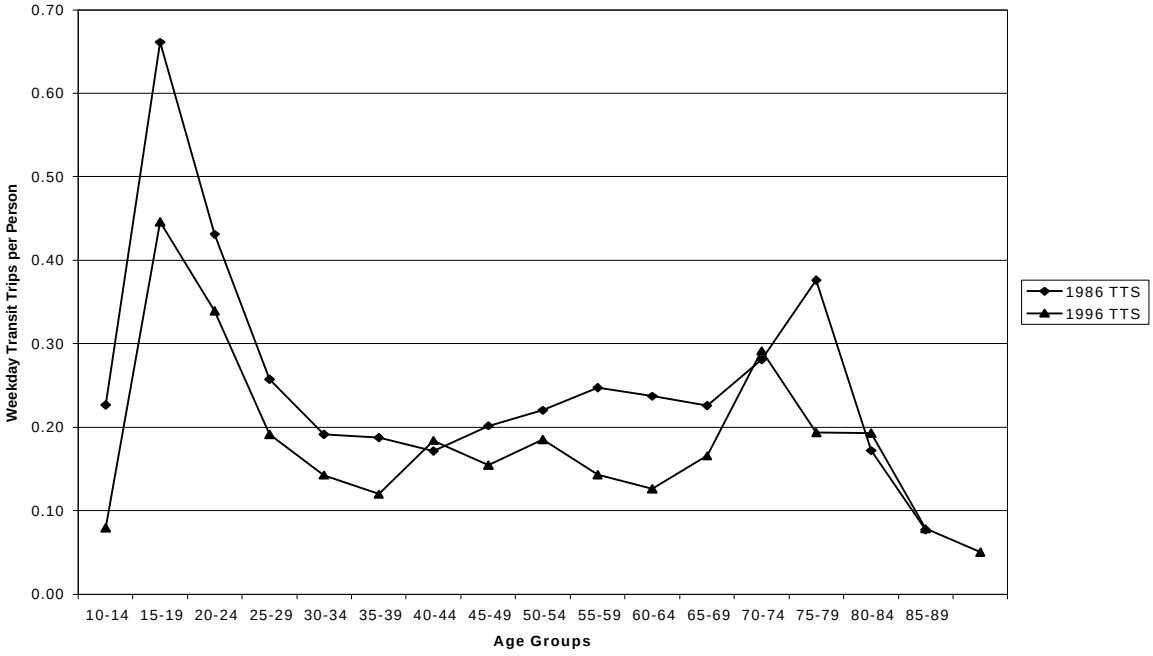


Exhibit 16b – Changes in Transit Trip Rates for Women in Hamilton-Wentworth



5. CONCLUSIONS AND RECOMMENDATIONS

This section discusses the major findings of this report and their implications for transportation planning in the GTA.

5.1 Present and Future Employment

The TTS provides a consistent historical picture of the labour force and employment for GTA and Hamilton-Wentworth municipalities for 1986, 1991 and 1996. Given the abandonment of municipal employment surveys by the regional municipalities in the late 1980's save for the ongoing Metro Toronto Employment Surveys (MTES), the TTS employment data presented in Exhibit 4 is the only consistent, area-wide estimates of employment at place of work for the 1986-1996 decade. These data, along with MTES employment counts for Toronto and Statistics Canada "Labour Force Surveys", document the impact of the recession on the economies of Toronto and Hamilton and the loss of jobs in both cities.

The 1990 recession appears to have stalled the long standing trend toward increased female labour force participation, particularly in Toronto and Hamilton-Wentworth, and accelerated the trend toward reduced male labour force participation, that had been associated with early retirements among men 55-64. The recession also resulted in a dramatic decentralization of employment opportunities that resulted in the changes in travel patterns documented in Section 4 in Exhibits 11a to 11g.

While the GTA and Hamilton-Wentworth currently has high unemployment rates among men and women, particularly those living in the cities of Toronto and Hamilton, this situation could change rapidly in the future assuming the continued recovery of the economy and recognizing future changes in age structure that can be expected to reduce the size of the working age population.

OGTA Employment Forecasts

The declines in employment and employed labour force relative to population reported in the TTS are not consistent with OGTA land use forecasts for the GTA and particularly the new City of Toronto. The Hemson estimates of employment for 2011 and 2021 do not appear to recognize the large declines in employment in Toronto and Hamilton that occurred after 1989 or the failure of the Toronto economy and Toronto's Central Area to recover from these job losses.

Part of the problem with the Hemson forecasts is the overestimation of 1991 employment. Whereas the Hemson Scenario 1 forecasts assume almost 2.6 million jobs in the GTA in 1991, the TTS results suggest the actual total is closer to 2.3 million. Whereas the Hemson forecasts assume that Toronto had 1.45

million jobs in 1991, the TTS and Toronto's Planning Department's estimates suggest that the actual figure was approximately 1.3 million.

Recommendations

The TTS results suggest that the land use assumptions that underlie recent and ongoing transportation planning activities should be updated to recognize the distinct possibility that Toronto's employment will be substantially below the expected 2011 and 2021 levels. Current estimates of 2011 and 2021 employment for Toronto and the GTA represent the highest levels that might be achieved, rather than the most likely scenario.

The findings with respect to land use forecasts highlight the need for GTA planning agencies to maintain accurate and up-to-date employment data at both the municipal and traffic zone level. The Census "place of work" data have not provided the required traffic zone level employment estimates because the data is not available on a timely basis and suffers from serious inaccuracies, especially in developing suburban areas.

The former Metropolitan Toronto Planning Department's employment surveys provide one model that should be considered by the other Regions in order to establish time-series information on employment trends at the traffic zone level.

5.2 Travel Demand Forecasting Assumptions

The 1996 TTS results also indicate that trip generation rates and mode-split forecasting relationships developed on the basis of the 1986 Transportation Tomorrow Survey should be reassessed in the light of the results of the 1996 Survey. For example, the observed declines in employed labour force/population ratios, increases in part-time work, changes in work trip rates for full and part-time workers, and the spreading of work and school peaks, suggests that trip generation rates and peaking factors should be adjusted downward.

A number of land use/locational, demographic, socio-economic and behavioural changes over the 1986-96 period imply reduced transit ridership potential in the future and the need to update current approaches to estimating transit mode choice.

The relevant changes include:

- The aging of the population and related transit ridership losses, as documented in sections 3.1 and 4.4.

- Changes in travel patterns related to the suburbanization of employment and decentralization of inner city workers, as documented in section 4.3.
- Increases in driver's licences among working women, as documented in section 3.2.
- Increasing numbers of cars available per worker (section 3.3).
- Declining mode splits and transit trip rates for some age/gender cohorts (discussed in sections 3.1 and 4.4).

These factors are all inter-related. For example, aging is related to the observed declines in transit trip making by age group, in that younger cohorts take their particular characteristics with them as they get older. Also, the decentralization of employment opportunities may well have made car ownership and operation necessary. Developing suburban job opportunities are often not accessible by transit.

Only GO Transit benefited from the decentralization of the downtown Toronto workforce. GO Rail services enjoyed substantial increases in ridership between 1985 and 1990, but lost ridership in the early 1990's when total employment in downtown Toronto fell. GO Rail's future depends on the future of the downtown Toronto economy.

Recommendations

The findings presented in Section 4 related to work trip generation and distribution underscore the need to update current forecasting models to incorporate the results of the 1996 TTS survey.

The changes in labour force activity, employment and trip distribution patterns observed in the 1986 to 1996 period were unexpected and are not reflected in current forecasts. These changes highlight the benefits of the Transportation Tomorrow Survey and the need to continue to monitor travel behaviour on a regular basis.

5.3 The Predictability of 1986-1996 Travel Pattern Changes

Most techniques used to forecast future travel patterns are calibrated to reflect existing travel patterns. The calibrated relationships are then assumed to apply to the future. The comparison of the 1986 and 1996 travel patterns reveals some significant changes in trip distribution that are not reflected in a straight extrapolation of 1986 live-work relationships. In order to have any chance of being able to predict changes of this nature one must have a good understanding of changes in live-work relationships and the forces that are bringing about these changes.

The significant changes that have occurred in the last 10 years highlight the need for further research and the necessity of updating the travel forecasting models on a regular basis.